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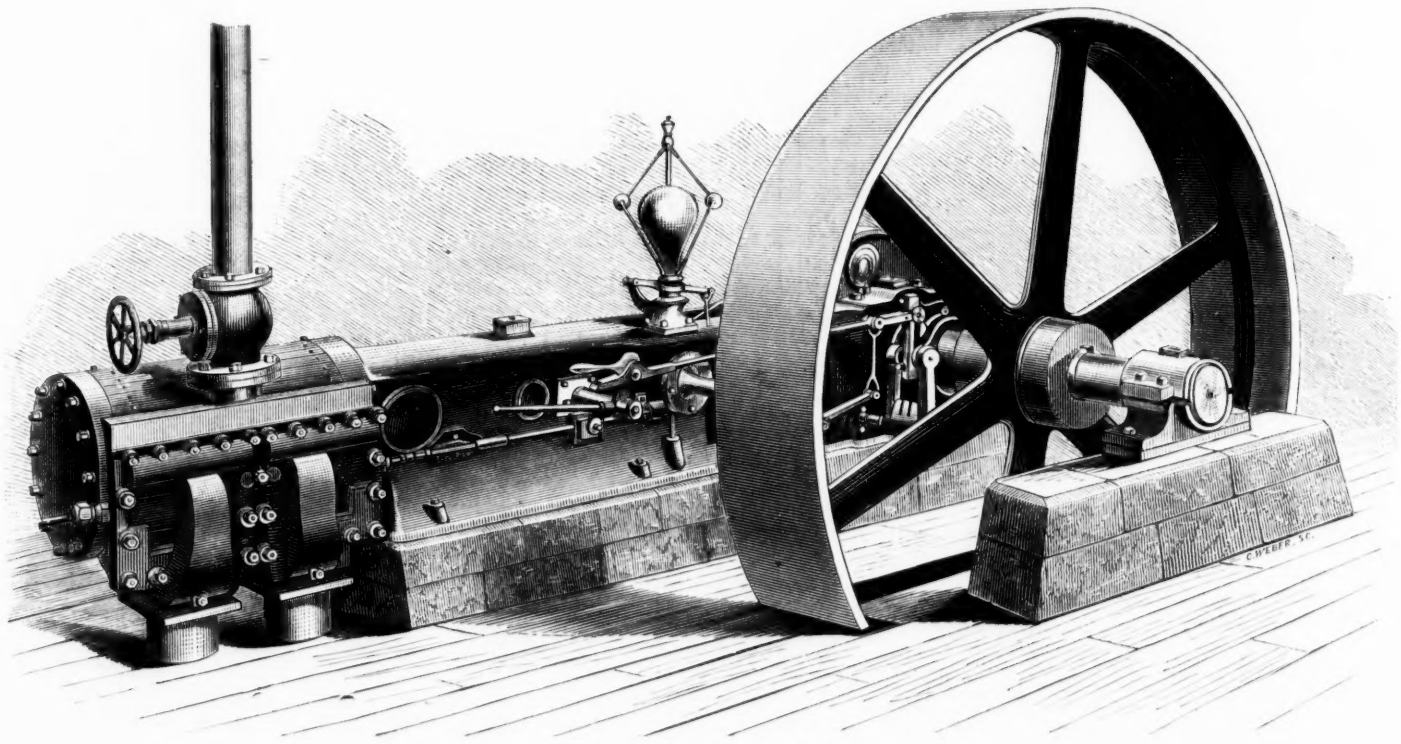
The Allen High-Speed Engine.

The engraving presented upon this page conveys a fair idea of the general construction of the Allen high-speed engine, as built at the Hewes & Phillips Iron Works, Newark, N. J. The bed of this engine is of a peculiar design, and is made with a view of getting a uniform quantity of metal upon all sides of a line drawn through the center of the cylinder.

The engine shown has a cylinder 15″x24″, and runs at a speed of 150 revolutions per minute. The cross head, which is round, is 13″ in diameter, and 16″ long, and is so construtced that when worn upon the bottom it may be turned upside down. The cylinder head, next the crank, is not attached to the bed, but is a separate piece placed between the ends of the bed and



THE ALLEN HIGH-SPEED ENGINE.

cylinder. The piston is constructed as light as possible consistent with the required strength. The connecting rod is a solid forging, the brasses being set up by tapered wedges. Two set screws are provided for adjusting each wedge, being placed upon opposite sides of the rod, which holds the wedges very firmly. A disc crank is used and provided with a steel pin, which is oiled by a pipe connecting with an oil cup, located in line with the center of the shaft, and attached to the outside of bed.

The main pillow block has quarter boxes having spherical bearings upon the wedges, insuring a perfect fit as the bed settles, or through any cause may vary from its original position. The eccentric and valve gears are fitted up in the best possible manner, the eccentric strap having an unusually long bearing surface. The link and pins are of steel, hardened and ground. The vertical adjustment of the link is introduced to compensate for the downward wear of the pillow block. The counterbalance weight of the governor is made separate from the collar. If a sudden strain is brought upon the engine the speed suddenly changes, frequently causing permanent injury to the delicate parts of the governor, when the weight is connected with the collar. But by separating them the weight is allowed to move freely of itself, when a check occurs in the speed. All the joints of the governor are oiled from the top of the spindle, a cavity passing down the center, from which smaller holes communicate to each of the joints. The oil is forced into each joint by centrifugal force. The valves of this engine are of peculiar construction, consisting of two slide valves placed at the ends of the cylinder. The valves give four openings for admitting the steam, equal to about one-tenth of the area of the piston and the same number of openings for exhaust.

The ports are short and straight; the bottom edge being below the bottom of cylinder takes all water of condensation from the cylinder. The steam-chest cover is adjusted to the back of the valve by set screws placed vertically; the valve seats and covers being placed at an angle. The edges of the valves wipe over the ends of the seats when cutting off at the shortest point, and every precaution is taken to prevent wearing shoulders upon any of the parts. All parts of this engine are adjustable to compensate for wear. All the joints are brought to a true surface, avoiding packing to make joints. Each part is oiled automatically, without stopping the engine; and, if necessary, a large quantity of oil can be applied. The engine is nicely balanced, and is well designed to accomplish the desired object in high speed.

The annual reception of the New York Microscopic Society was held at the Academy of Science, in New York, February 15th. President Romyn Hitchcock delivered the annual address on "The Relations of Science to Modern Thought."

Demand and Supply.

BY F. F. HEMENWAY.

I wonder if it ever puzzles the manufacturing economist—I mean one of those individuals who is always ready to tell us just how everything ought to go—to fix the exact relation between demand and supply in the machine business. If a man is unfortunate enough to own a machine-manufacturing establishment, and foolish enough to enter into the manufacture of some standard article of trade that is fifty per cent. better than anything of the kind in the market, and has to sell it twenty per cent. higher than the poorer article sells for, the chances are that he will not find himself overcrowded with business. He must manufacture on the one hand, and on the other he must sell and create a demand. There is always a fair prospect that among the three he will become a martyr to his good intentions. If he turns his ambition to the manufacturing of something fifty per cent. poorer and twenty-five per cent. cheaper, he has only to manufacture and sell. The demand already exists. A man who runs a machine shop for dollars and cents will hesitate before he takes the chances.

It takes a vast amount of missionary work to institute radical changes in the products of the machine shop when these changes involve higher prices; and the average machinist hasn't of necessity enough self-sacrificing spirit to submit willingly to be eaten up by the heathen of trade. On the one hand he sees a small chance of fame and a big chance of bankruptcy; on the other a reasonable prospect of fair profits. The question naturally suggests itself to him if it isn't fair for the user to pay for his own tuition. There are a great many things in the mechanical world that are not right, and they will have to come up to the condition of being nearly right through much tribulation. Take the average steam gauge for instance. It isn't good for anything, and no one knows it better than the manufacturer. But with the public it has one redeeming quality—it sells for $4. Any man possessed of sufficient intelligence to buy a steam gauge knows that $4 won't pay for a decent apology for one; but he will buy two a year at that price, and know all the time he can't get any facts from their indications, rather than pay $15 for a good one that will last twenty years. You couldn't persuade that same man to buy a $25 watch. He wants one that will keep time. There isn't a manufacturer in the country that wants to make $4 gauges. There isn't one but knows it isn't good policy for the user to buy $4 gauges. I doubt if there is one that isn't disgusted with his efforts to create a demand for something better, and in the end has been compelled to meet the demand as it exists.

It is difficult to institute a comparison between things altogether bad, but if there is any one thing that gets down lower in the scale of quality than a $4 steam gauge, it is the commercial globe valve. Put one up against fifty pounds pressure and it commences by leaking, and continues to leak in a gradually increasing ratio for two months, at the end of which time it fails to produce any noticeable strictures, and you take it out and grind it;—only you don't, not if you have had the pleasure of wrestling with them to any extent. In fact, you don't in any event. If you are new to the device, you remove the cap and find there isn't enough of it to grind, and that it wasn't worth grinding in its original glory. You furthermore find the apology for a thread just ready to strip, and discover why you could never keep the stem packed. You take it out and try to get in another $\frac{3}{32}$″ shorter or $\frac{1}{16}$″ longer; shorten a long nipple

or lengthen a short one; make a couple of bends in the pipe to compensate for want of alignment in the threads, and the next day order a dozen more just like it for similar emergencies. You don't buy better ones because they are not in the market. And they are not in the market because you wouldn't buy them if they were. No man pays $1.50 for a globe valve that will last five years when he can buy two for the same money that will last, collectively, four months. If you have had some little experience with such frailties, the only difference is you always have some on hand, and their failure don't even cost you a profane thought.

Should you (which is not likely) be inquisitive enough to speculate as to why some one don't make such things to last, you may readily ascertain that people foolish enough to do so have existed before now, but they didn't get the means of existence from the sales of their product. There is too much difference between two pounds of castings worth thirty-five cents a pound, and one pound worth sixteen cents. The conversion of the entire Chinese nation would be a trifle compared to the creating of a demand for a good globe valve. The standard check valve and water-line fittings are no worse than the globe valve; not from any lack of intention, but because there isn't any further room for progress in that direction. Such as they are, they are just what is demanded. That is, they are cheap—and not much else.

A few years ago it was possible to buy finished nuts that were case hardened instead of blued, and were tapped in the center of the stock and faced up true with the thread. At the same time it was possible to buy studs, made from fair iron with reasonably good threads cut to standard sizes. As these could be bought by most users cheaper than they could be made, the prospect for reasonable excellence seemed assured. But the demand was for something cheaper, and, to meet that demand, consumers got nuts case hardened in name, holes anywhere from $\frac{1}{8}''$ to $\frac{1}{4}''$ out of center, sizes of such variety that a respectable wrench won't fit one of them, and faces at all conceivable angles. In the way of studs they get the poorest quality of iron that can be worked, threads cut with worn out dies, and crowded over to all pitches but the correct one, and of infinite assortment in the way of sizes. The manufacturers are meeting the demand; they are selling cheap.

There is a call in some quarters for material changes in machine tools, especially in the engine lathe and in the direction of greater strength. When this call becomes a demand the supply will be forthcoming. At the present time, if there is a manufacturing establishment in this country able to add the necessary educational bureau to its other list—that concern has money enough to retire its members. The perverseness of human nature is such, that a large majority of purchasers are better satisfied with the present combination of prices and quality than they would be with any change involving an increase in both. After all, there is frequently a reason for things that is not our reason. For instance, one eminent engineer wants a sixteen-inch lathe that will turn sixteen inches, that is of ample strength, etc.; and undoubtedly he has use for such tools. A large percentage of sixteen-inch lathes, however, are sold to parties who use them forty-nine days on diameters from $\frac{5}{8}$ths of an inch to 3 inches, and one day on diameters as large as they will turn. They don't amount to much that one day, but by the exercise of some patience, and by considerable nursing, they are made to do. There is a question, and it is worth considering (I am not going to try to decide it) whether it is better to be at some inconvenience one day than to use twice the necessary power to drive, twice the oil to lubricate, and twice the manual persuasion in moving the rest and carriage forty-nine days. Other factors that must be considered are increased cost, room, and weight. A smaller lathe, if made proportionally stronger, would of course be all right for the forty-nine days, but all wrong the fiftieth day. If this same engineer was asked by his friend, the tool builder, to furnish him with an engine fitted with a shaft so large it couldn't spring, it wouldn't take him long to explain that he had in this respect made what he considered the best possible *compromise*, notwithstanding which he would candidly admit that the springing of engine shafts sometimes causes inconvenience. It is possible that the tool builder, looking at all sides, has made what he considers the best compromise. If a party wants a twenty-horse power engine, with a ten-inch shaft, he can undoubtedly get it built, but he will have to contract for special work and at special prices. He won't find any one building engines that way. If a considerable number of purchasers are looking for such engines, they will find plenty of builders making them so. If one or a half-dozen men want sixteen-inch lathes with five-inch shafts, they will have to get them built as special tools. If a thousand parties are looking for such tools, they will soon find them in market as standard productions. I am by no means reasoning that a general advance in the way of strength in all machine tools wouldn't be a blessing. Possibly it would; but before that advance is made there must be an unmistakable demand.

There would seem to be evidence enough as to the best classes of steam engines, but if every builder in the country were to confine himself to high-priced automatic or compound engines, we should soon be in the condition of importing. It took considerable capital and more perseverance to start one manufacturer in the line of automatic engines, and it has taken a number of years to educate enough users up to demanding the products of a few more in the same line. It is one thing to find the public grumbling over existing products, and quite another thing to find them demanding something better in the sense of being willing to pay for it.

I wonder how much of the average defective action of the engine lathe is due to its setting?

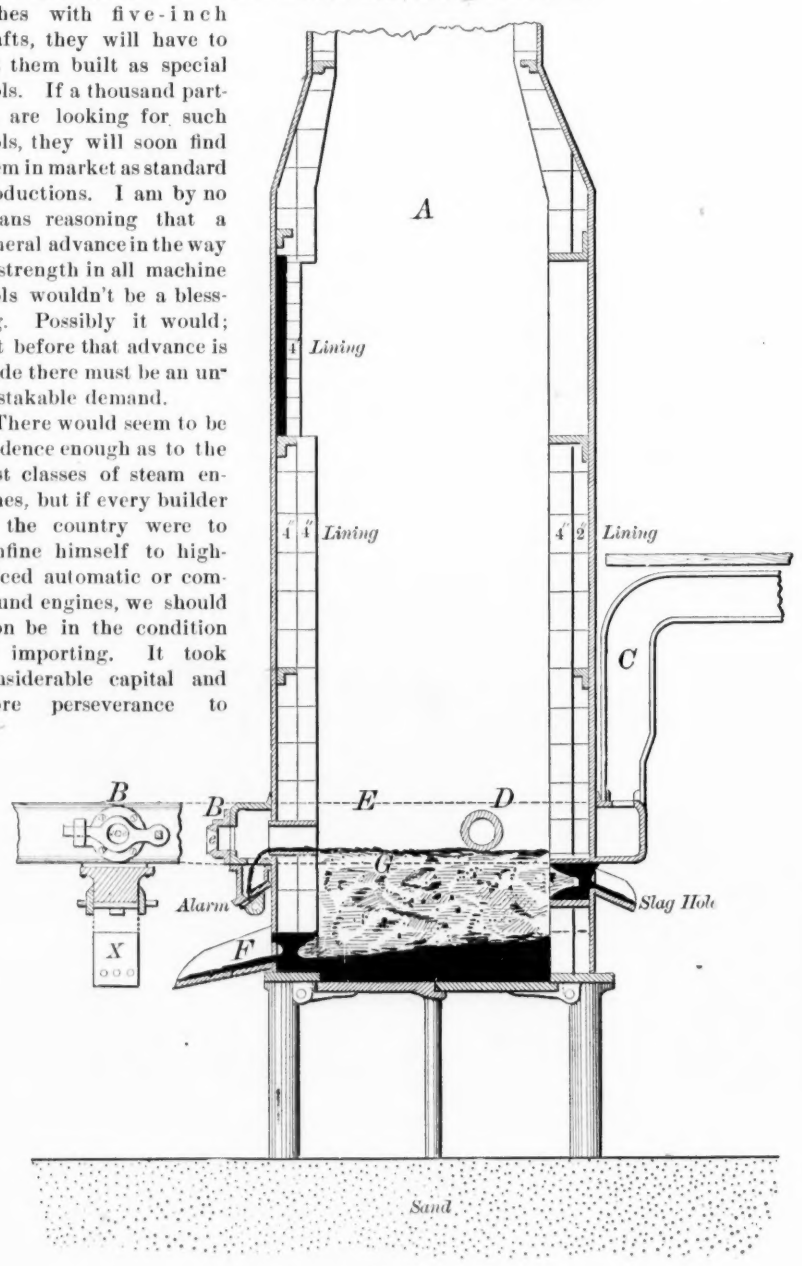
If a man buys a steam engine, he don't make a struggle against putting down a foundation anywhere from six to ten feet deep. If the same party puts in a thirty-inch engine lathe with a sixteen-foot sill, he will set one leg at each extremity on a rotten floor, and then to the unnatural twist and natural deflection he will add the strain of the tool when cutting. Then it is easier to grumble about the lathe than its surroundings.

The Foundry Cupola.

By Thos. D. West.

The various shapes given to foundry cupolas are generally controlled by circumstances.

There are traditions extant of men, who, in commencing business, could not afford a cupola possessing the proper qualities and capacity to do the work required, so barrels were lined with bricks and clay by some, while others, who were more enterprising and also better mechanics, made a square cupola of open sand plate castings, bolted together. These make-shifts will do for past generations, and in localities where there is a lack of capital. But the business man who understands how to run a foundry economically, insists upon having a first-class cupola, if it is to be had. There are two principal styles of cupolas, viz., the oblong and round.



An Alarm Foundry Cupola.

The former possesses the advantage of allowing whole pigs and long pieces of iron to be "charged up," without requiring them to be broken in small pieces; the latter style is, however, more generally used. The governor of a cupola is its tuyeres. A most essential point in their construction is that the openings in the tuyeres should not face each other; the object of this is to prevent the wind from one tuyere striking the other. Cupolas are better arranged when set so as to have three or five tuyere holes. If divided equally, they should be set on a slant, or pointing a little to one side of the center of the cupola, which will cause the wind to circle around the inside, moving spirally in the same direction. The tuyere holes should be of an equal size to admit all the blast, requiring little more pressure than is in the pipes or wind boxes. If these directions are observed, it will not be the fault of the tuyeres if the cupola does not melt well.

The shape of a tuyere hole is made to suit many different opinions; some preferring them flat, claiming to save fuel thereby. The distance of a tuyere from the bottom or bed is determined by the class of work to be done, for instance, in foundries for making stove plates; the height of tuyere from the bed should be from 7″ to 15″; while in machine or jobbing foundries they should be higher, say, from one to three feet, according to the amount of iron required to be melted at one time. The advantage of low tuyeres is a saving of fuel.

For melting large quantities of iron, it requires the same amount of fuel to melt over a low tuyere as it does over a high tuyere.

But in melting small quantities, the low tuyere has the advantage, from the fact that there is little danger of the blast passing over the top of the fire.

When this occurs, or the top of the fuel gets near the mouth of the tuyere, trouble may be expected, as the stock is in danger of setting.

Another reason for having high tuyeres for use in machine or jobbing foundries is, that a large body of iron is required to be melted, before tapping out the iron into a "crane ladle." The object is to have a large body of iron to retain the heat, as sometimes it takes two or three hours to melt enough iron to pour a heavy casting. This course also gives time to allow the scrap iron of all descriptions and grades, also heavy solid pieces of old castings, to re-melt and become thoroughly mixed with the new iron which has been added.

A cupola with tuyeres high, will melt more, and run longer heats than it would if the tuyeres were low; but there are times when both would be an advantage. To meet this want, I would suggest that two sets of tuyeres be applied to the cupola, and placed one above the other. These can be easily arranged, so that either set may be employed to advantage, using the high tuyeres for heavy heats, and the low tuyeres for light heats.

The openings of the tuyeres not in use are to be stopped with clay. A very convenient form of alarm, for indicating the highest limit to which the melted iron is allowed to rise in the cupola, will be readily understood by the following description. Referring to the accompanying engraving, it will be observed that the melted iron has reached the highest limit allowable, and is running through the tuyere hole into a small cast iron box, having an inclined wooden bottom.

This bottom, shown at X, has three holes of one inch diameter, bored through within $\frac{1}{8}''$, allowing sufficient material to prevent the wind from escaping.

The bottom is held up tightly in place by a piece of round iron and a wooden wedge, as shown. This device should be attached to the tuyere nearest the spout F, so as to be easily observed. It is of essential importance to have the tuyere, to which the alarm is to be attached, about one inch lower than the rest, in order that the alarm may be given in time to prevent the melted iron from running out of the higher tuyeres into the pipes C, D. When the melted metal rises to the height of the low tuyere, it will run into the alarm box, filling the holes and burning through the wooden bottom to the floor almost instantly. A ladle should be placed under the alarm to catch the melted iron, which may be placed in the larger ladle and used in casting. Several extra wooden bottoms should be kept on hand, to replace those burnt out.

The tuyere valve *B*, forms a very convenient air-tight opening, and furnishes the means to bar into the cupola, or inspect the same, as a piece of mica is fastened into the opening *e*, with putty.

The application of the alarm described, to a cupola, effectually prevents the excitement which usually prevails in a foundry when the melted iron overflows, resulting in heavy losses of castings.

The workmen are frequently and sometimes badly burned by accidents of this kind, and there are many cupolas in use

having quantities of iron in the wind boxes and pipes, thus obstructing the passages. The pipes are frequently destroyed by the hot metal, while in others they have to be patched. The workmen have to rely upon their judgment generally to determine the height of the iron in the cupola, and sometimes are deceived. In some instances the tuyeres are so constructed than an alarm could not be applied to them; in such cases I would recommend the application of a blind tuyere one inch lower than the working tuyeres, and attach the alarm to it. This useful appliance is, I believe, original, and is hereby given to those who may wish to use it.

Improved Screw-Cutting Lathe.

In cutting screws of a different pitch upon ordinary lathes, it is generally necessary to remove the gears previously used and replace them with others. These operations consume much time, particularly where a number of changes are to be made.

To obviate this and other difficulties, numerous designs have been tried, such as placing a number of gears upon the end of the lathe, etc.

One of the most successful devices of this kind is shown by the accompanying engraving. It will be observed that the mechanism is confined to the least possible space, yet affording all the advantages of the numberless changes required for screw-cutting.

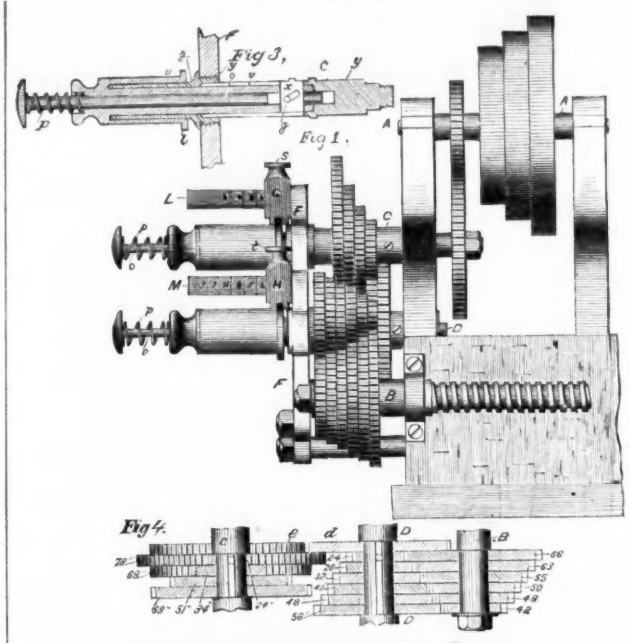
In this invention two systems of gears are used; one system being driven from the live spindle, and in its turn driving the other system that communicates directly with the feeding screw. Each system consists of two series of wheels, each system having a common spindle or shaft, and the wheels of one series being fixed to their spindle and intermeshing with the wheels of the other series, which are made to turn loose upon their spindle, except when some one of them is thrown into rigid connection therewith by suitable mechanism. This mechanism, for engaging and disengaging at will any one of the loose wheels with their supporting shaft, consists of a radially sliding key or dog in the spindle or shaft, operated by a pin sliding in an inclined slot in the same. This key is pushed in or out by the combined action of a central rod and an annular slide, arranged concentrically with the spindle, which is made hollow to receive them, and extends beyond the end of the same.

A front elevation of the head gearing, also a part of the bed and leading screw of a screw-cutting lathe, is shown in Fig. 1. The screw is intended to connect with the carriage in the usual manner.

The spindle is represented by *A*, to which is attached a cone, as usual; and *B* is a part of the leading screw, which may have a pitch of four, or any other desired. On the end of this screw are six gears, rigidly attached thereto, and having the following number of teeth: 42, 48, 50, 56, 63, 66 (see Fig. 4). The revolving spindle *D*, carries seven gears, six of which, designated as follows, 56,′ 48,′ 40,′ 32,′ 28,′ 24;′ are free to move thereon independently of the motion of the spindle, and of each other. These gears work into the wheels upon the end of the screw *B*.

The seventh wheel *d*, is rigidly attached to the spindle *D*. The stud *E*, located beneath the spindle *C*, carries five gears fiixed and revolving together; four of which, 34″, 51″, 68″, 78″, gear respectively into the wheels upon the spindle *C*; the fifth, *e*, gearing into and of the same number of teeth as the seventh wheel on the spindle *D*. The spindle *C*, is constructed in the same manner as *D*, and has four wheels, 24ˣ 34ˣ 51ˣ 68ˣ, revolving in the same manner as those on *D*. On the end of the spindle *C*, is a wheel *c*, keyed to the spindle and gearing with a wheel of half its number of teeth keyed to the spindle *A*.

A plate or standard *F*, supports and forms one of the bearings of the spindles *C* and *D*. Fig. 3 represents a longitudinal section of



GEARING FOR SCREW CUTTING LATHE.

the compound spindles *C* and *D*. The hollow spindle *y* has a slot cut through it the width of the thickness of the adjustable key or dog *x*, and the length of the space that the wheels will occupy on the spindle. The spindle *y* is supported at its outer end in a bearing *z*, fixed on the standards F (see Fig 1), and extending outward therefrom in the form of a hollow stud, as represented in Fig. 3.

Fitted concentrically in the hollow spindle *y* are an annular slide *v*, and a rod *o*, capable of both common and relative movement, longitudinally within the said spindle; the slide *v* being guided by the hollow stud *z*, and the rod *o* by the slide *v*. The slide *v* and the rod *o* are slotted to receive the dog *x*, the slot in the slide *v* being made to fit the dog so as to effect its longitudinal adjustment, while that in the rod *o* is longer than the width of the dog, so as to permit the relative endwise movement of the said rod which moves the dog radially out and in by the agency of pin *q*, fixed in the rod *o*, and passing through an oblique slot in the dog *x*. To retract the dog *x* within the spindle *y*, the fingers are applied to the head of the slide *v*, and the rod *o* pressed in with the thumb. The slide *v*, carrying the dog may then be moved endwise as required, and on being released the rod *o* is pushed out endwise by a string *p*, so as to advance the dog and cause it to engage with any one of the wheels to which it may be set.

The adjustable key or dog *x*, slides in and throughout the length of the slot in the hollow spindle *y*, passes through a slot in the rod *o*, and is free to move up and down in a slot which it fits in the slide *v*, so as to engage with any one of the wheels on the spindle.

3	D′	J′
4	D′	I′
5	D′	M′
6	C′	J′
7	D′	G′
8	C′	I′
9	D′	F′
10	C′	H′
11	D	E′
12	B′	J′
14	C′	G′
15	B′	I′
18	C′	F′
20	D′	H′
22	C′	E′
F	A	E′

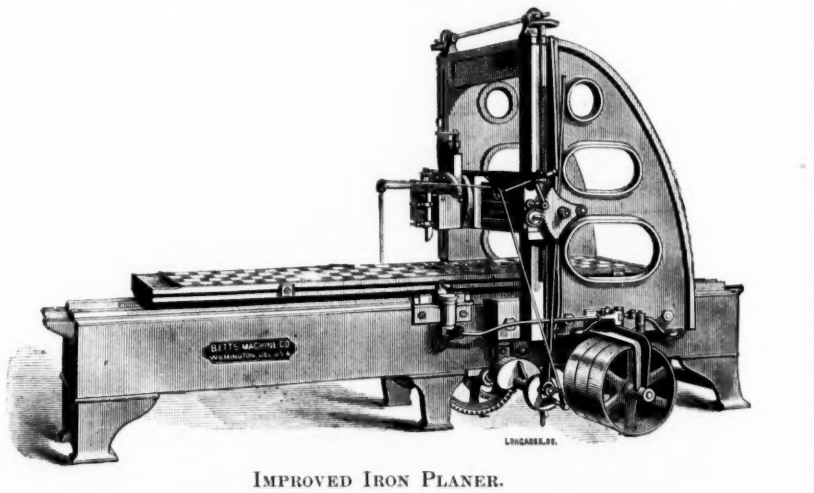
Fig. 5.

The slides *G* and *H*, having square holes, are free to slide upon the square pieces *L* and *M*, which are screwed into the frame *F*. The pins *s* and *t*, pass through the upper part of the slides and into the square studs referred to. The square studs have holes corresponding in number with the letters thereon to receive the pins *s* and *t*, while on the lower parts of the slides *G* and *H*, are grooves to receive the collars upon the slides.

We will now suppose that the spindles *C* and *D*, are in the positions shown in the drawings, the pins *s* and *t*, in the holes *A′* and *F′* respectively, and the keys *x* (see Fig. 3), in the wheels 24″ on the spindle *C*, and 24ˣ on the spindle *D*, which positions will give the common feed for turning. Now suppose it is desired to cut a thread with a pitch of eight to the inch. The necessary adjustment is effected as follows: Lift the pin *s*, out of the hole in *L*, and press the two knobs on the end of the spindle together. This will draw the key down and out of the wheel 24ˣ leaving the parts *v* and *o* of the spindle, together with the key, free to move horizontally. Then, by pulling these parts out, the slide *G* will move with them. The knobs should be pulled until the pin-hole in *G* comes fair with the hole *C′* in *L*, and the pin dropped in, which will leave the key in wheel 51ˣ. The same operation should be repeated with the spindle *D*, until the pin drops into the hole *I*, which will leave the key in wheel 48′, and give the desired pitch.

Other pitches may be easily obtained by consulting the table shown in Fig. 5. The gears, as shown in Fig. 1, will give 24 changes, besides 6 positive and well graduated feeds, varying from 70 to 20 per inch, simply by changing the lower slide. An extra screw, for screw-cutting alone, may be located beneath the screw *B*, when desired.

These improvements are made and applied by C. W. Riley, Knoxville, Tenn.



IMPROVED IRON PLANER.

Improved Iron Planer.

Some essential features of the iron planer may be noted: The belts, to shift nicely, must not be too wide, but the gearing must be so proportioned as to give the belts a high speed, so as to insure a powerful machine. The bed plate must be strong and heavy, well braced with cross girts, particularly at the point where the gearing and uprights are placed. If such is not the case, it can readily be seen that, with the tool at the top of the uprights and cutting on one side, it is possible (if the machine is weak) to spring the bed plate, causing the uprights, cross head and tool to be pushed to one side. Next in order, the uprights must have a good long bearing on the bed plate, and so secure as to make them as solid as if cast in their places. These features, together with a good strong cross head, properly arranged with a cored back, and the several pieces that fit on it, to carry the tool in the different positions it is required to be placed in, besides a proper and convenient adjustable feed motion, make the elements of an excellent tool. In examining a machine, we cannot help noticing the bed plate or foundation on which the structure is built. Let it be faulty in this respect, and all of the good devices which may be applied in other places will not serve to make it a good tool.

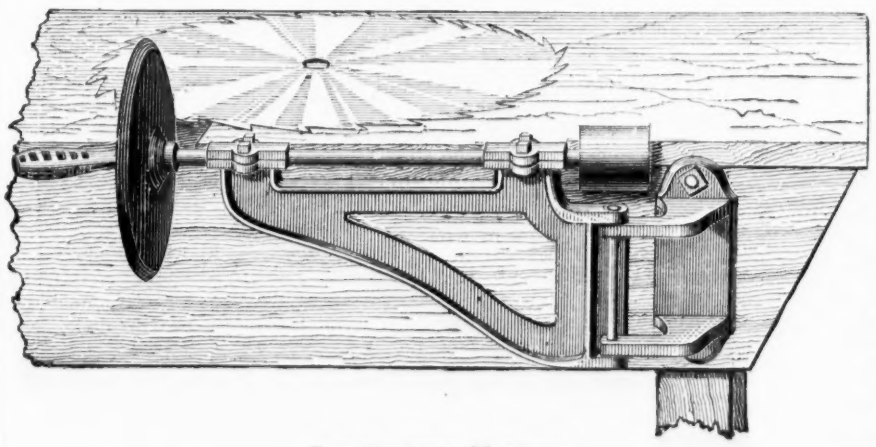
Most of the builders are now using two driving belts, one for the go-ahead, and the other for the go-back; thus doing away with a number of gear wheels that must be used if only one belt is on the machine—we consider this a move in the right direction.

The angle of the V's is also another "bone of contention," some of the builders preferring them quite flat, while others contend they should be 45°, so as to resist the raising of the tables from the beds in very powerful planers when cutting on side work.

A nice little device for oiling the V's of the planer shown in the cut, is made by inserting rollers in the table so they will drop into oil wells in the bed plate at intervals of the stroke of the table, and distribute the oil over the wearing surface.

In designing this planer, the excellent qualities here mentioned have been kept in view. A large number of these planers are now in use, the largest one yet made being capable of taking on a piece 10 feet square, and weighs nearly 60 tons.

They are made by the Betts Machine Co., Wilmington, Del.



SAW GUMMING MACHINE.

A Saw Gumming Machine.

The accompanying engraving has come into our possession from some mysterious source. We do not know who the manufacturer is, nor where he is located, but the machine seems to possess some degree of merit. It consists of a strong cast-iron bracket bolted to a table. From this bracket a cast-iron crane is suspended, carrying a shaft. The shaft is driven by a belt upon a pulley, shown upon one end, and an emery wheel is placed upon the opposite end. Stops are provided, permitting a sufficient swinging motion of the crane to allow the emery wheel to do its work of grinding out the teeth of large saws. The saw is placed upon the table as shown, and the operator moves the shaft and emery wheel by means of the handle attached to the end of the shaft. The movement of the crane at the pivot is so slight that there is no danger of the belt running off.

If any of our readers can inform us where it is made, we would be pleased to have them do so.

Shop Kinks.

No. 6.

WRENCHES FOR FINISHED WORK.

By L. F. Lyne.

One of the most incomprehensible things in my experience has been the object of finishing up bolt heads and nuts, and afterwards applying a hard, rough wrench for tightening them. I have frequently seen nuts finished four, and even more, times before a machine or engine leaves the shop.

When this occurs, it is impossible to preserve standard sizes; moreover, all extra time given to finishing after that operation has been once performed is time wasted, and is so much money taken from the profits of the manufacturer.

A little forethought is all that is necessary to prevent the waste of time alluded to; besides, it is just as easy to avoid marking or tearing the corners off a finished nut as it is to disfigure them.

While examining a fire engine a few days since, I was shocked to find the corners torn off the nickel-plated nuts, besides other evidences about the engine of butchery with a wrench. The easiest and most economical way to avoid these annoyances is to have wrenches lined with "babbitt" or other soft metal, which may be made of such a degree of hardness to resist the strain of turning the nut, and yet be sufficiently soft to prevent injuring its delicate corners.

A box wrench, lined with soft metal, is shown in Fig. 1, where *b* represents a finished nut, *a* the wrench, and *c* the lining. The lining is prevented from slipping out of the wrench by two projections *d d*, formed by the soft metal running into holes previously drilled. For lining wrenches in the manner described, it is not necessary to be particular in filing them out, as the fit is made upon the soft metal. Mr. C. H. Brown, of Fitchburg, Mass., and builder of the Brown engine, is the first manufacturer, to my knowledge, who originated and has adopted this plan of making wrenches for use upon his engines.

I propose to carry this improvement a step further by lining the jaws of screw or "monkey" wrenches with soft metal, as shown in fig. 2, *e* representing the shank of the wrench, and *f g* the jaws. The linings are represented by *h h*, being held in place by the projections *i i*. A wrench of this kind should be kept on purpose for putting finished work together, and should never be used upon rough work.

Further comment is unnecessary, as the skilled mechanic will readily appreciate the suggestions from the illustrations. If any one adopting this style of wrench finds them unsatisfactory, I would be pleased to hear the objections.

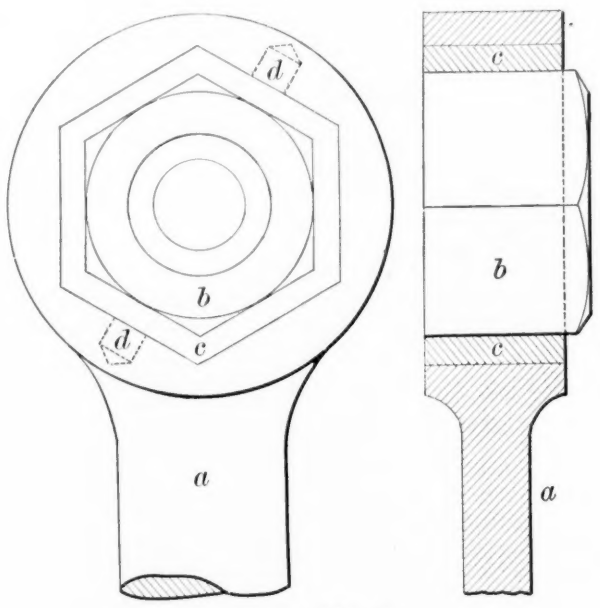


Fig. 1.

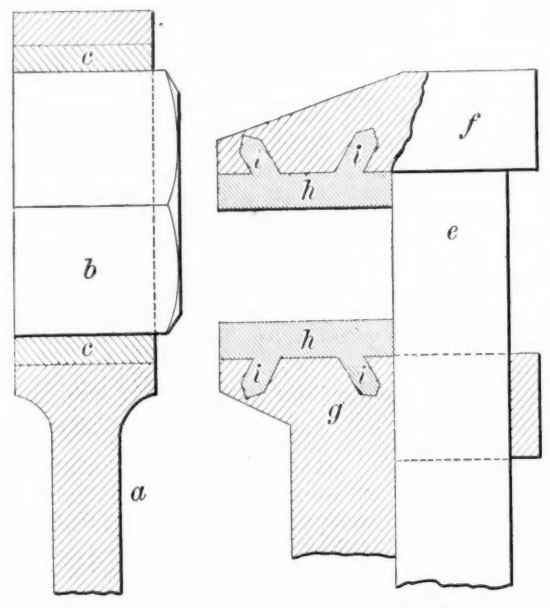


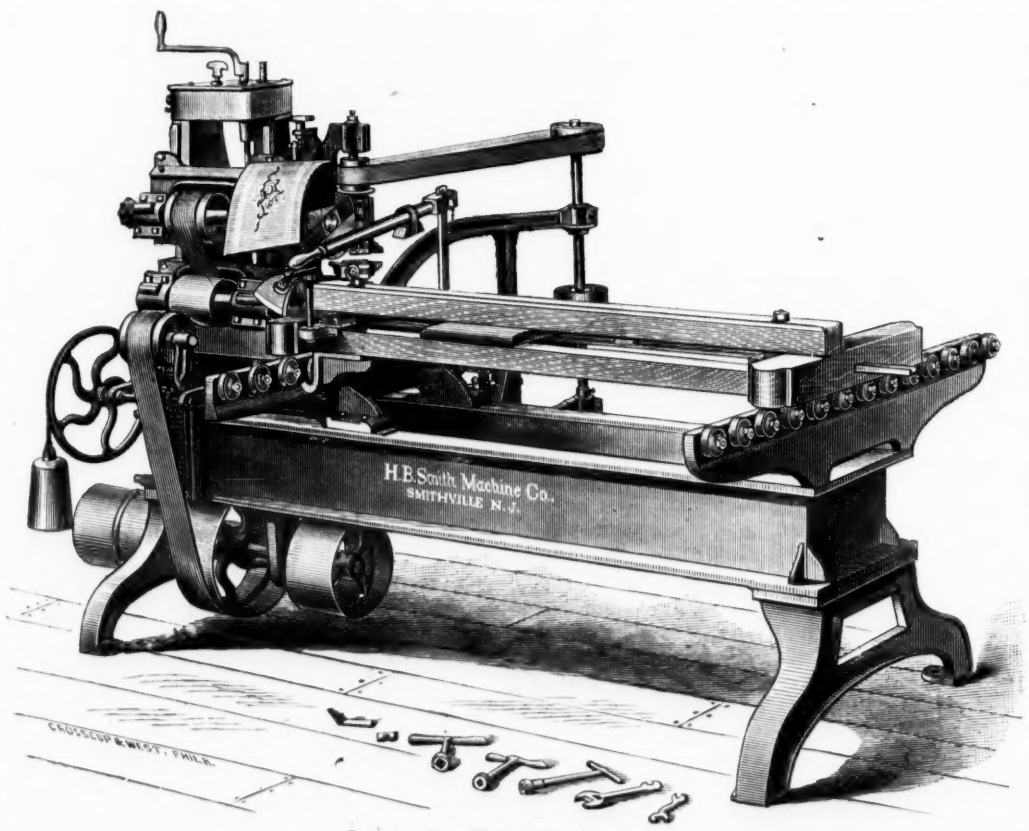
Fig. 2.

New Car Tenoning Machine.

The large tenoning machine represented by the engraving on this page was recently made by the H. B. Smith Machine Co., Smithville, N. J., for the Jackson & Sharp Co., Wilmington, Del. It is heavy enough for all the ordinary framing used in the construction of railway cars. It will cut tenons 7½ inches long at one operation, and will receive timbers say 12x12 inches, and of the usual length. In the engraving coping spindles are shown, but the machine can be arranged, when so ordered, to make double or triple tenons, by means of a vertical shaft with suitable heads, with which to divide the wide tenon after passing the horizontal cutter heads.

The cutter heads may be adjusted up or down together, or each independently, and the coping spindles being mounted on the same head stock adjust with the heads; besides, these spindles have a compound independent movement. The upper cutter head is provided with an end adjustment, so as to regulate the position of the shoulders on the tenon. The belt is provided with a belt-compensating arrangement that keeps the tension of the belt uniform, regardless of the position of the cutter heads. The cutters produce the "drawing cut," and therefore work smoothly. The carriage moves easily on rollers, and is kept square by the grooved rollers at one end and the device which prevents the carriage from being lifted from the grooved path.

The speeded shafts are of steel, and the bearings are lined with best babbitt metal.



Large Car Tenoning Machine.

Weston's Hand-Power Traveling Cranes.

We illustrate on page 5 a very neat, simple and efficient overhead traveling crane, made by The Yale Lock Manufacturing Co., Stamford, Conn., under the patents of Mr. Thos. A. Weston, the inventor of the well-known differential pulley block. In 1875, the company acquired the control of Weston's American patents, and, after developing the pulley block business, engaged in the building and introduction of the larger forms of hoisting machinery, including cranes, which were covered by the Weston patents.

The crane herewith illustrated has a capacity of six tons. The cranes, however, are built of any desired capacity from 1 ton to 10 tons. For larger sizes, a different type of machine is employed, in which the motions are effected by power taken from a line shaft.

In the present machine, both the hoisting and traveling mechanisms are contained in the moving crab, or "trolly," on the bridge. Four endless hand chains depend from this crab; two of them for effecting motion, and the other two for hoisting and lowering. By pulling one or the other of these chains, the crab is caused to move endwise on the bridge, or the bridge caused to travel lengthwise on its tracks; or, if desired, both motions can be made simultaneously, the resultant being a diagonal line. It follows, therefore, that every inch of the floor spanned by the bridge and its tracks can be reached by the machine. A load may be lifted from any point on the floor, raised high enough to clear intervening obstructions, and be deposited at any other point desired. All of these motions are easily effected by the operator from the floor below. Hoisting and lowering are controlled in like manner, and at various speeds. A patent safety device is employed, whereby the load is at all times self-suspended, and cannot run down. To lower it, it is necessary to reverse the motion of the hoisting chains.

The Chinese government has resolved to allow railroads to be built in the Empire.

Fish's Improved Variable Cut-off Valve.

We illustrate on page 5 a simple cut-off valve for steam engines, which in its action combines the principles of a slide and drop valve together. One of its prominent features is that it has no springs or other appliances requiring constant attention and delicate adjustment to keep in order. For stationary engines it can be controlled by the governor, and for hoisting or propeller engines, it can be thrown off, or on, instantly by hand.

It will be observed by referring to fig. 1, that the cut-off valve *A* is attached to a rock shaft that passes across and through the steam chests. Upon the end of this rock shaft the lever *B* (fig. 2) is secured, in which are guides carrying rock bars *C*, having beveled tappets upon the ends of them. These tappets are moved by the toes in sliding bar *F*, which receives its motion from the eccentric rod *E*. As the sliding bar *F* moves back and forth its toes come in contact with the tappets in the lever *B*, causing it, and consequently the cut-off valve *A* (both of which are secured to the rock shaft) to vibrate, and alternately cover the admission ports in the back of the main slide valves. The slide valve moves at the same time between the cylinder face and the under face of the cut-off valve.

The point of cut-off in the stroke of the piston is determined by the position of the tappets in the lever *B*. This position is controlled by the rod *D*, which connects the governor to the rock bars *C*, by means of the pinion and lever which swing loose on the rock shaft. *H*, represents the lever *B*, prolonged on the opposite side of the rock shaft. The end of this lever *H*, abuts on rubber discs or cushions let into the stop blocks *I I*. These blocks have set screws at the ends, as shown, so as to give the necessary amount of cushion to let the cut-off valve down quietly on its seat. A governor is sometimes used in combination with this cut-off, controlling the position of the eccentric on the shaft. When this is done, adjustable tappets in the lever *B*, are dispensed with, making this part of the device much simpler and less expensive to build.

One of the peculiar features of this style of cut-off valve is the small amount of force necessary to move it, being balanced in all positions when required to close it. Another advantage is the rapidity with which it can be shut on or off when it is controlled by hand, the operation being instantaneous.

This valve is placed before engine builders who desire to make substantial improvements in design, by the inventor, John Fish, 10 Pine St., New York.

Much local interest is being excited in the proposed railroad from Alpena, Mich., southward along or near lake Huron to Bay City, about 120 miles. That region is now entirely destitute of railways.

The demands of the stove moulders throughout the west for advance of wages have been complied with. The strike was for an addition of 15 per cent., and was begun in St. Louis several weeks ago.—*St. Louis Age of Steel.*

It is estimated that the trade balance in favor of the United States for the month of January will be about $20,000,000, and for seven months of the fiscal year nearly $87,000,000. Last year, by the end of January, the imports of the port of New York for seven months were $79,795,618 in excess of the imports.

This year we close the seven months with imports only $60,067,690 in excess of the exports, and a comparatively free movement of grain to Europe.

LETTERS FROM PRACTICAL MEN.

Co-operation of Pattern Makers and Moulders.

Editor American Machinist:

Having read the various articles contributed to your excellent paper by pattern makers and moulders, I cannot resist the temptation to have my say. I do not agree with those pattern makers who claim they have no need to consult the foundryman on matters pertaining to the trade. In my experience in pattern making, I have always found it an advantage to all concerned to have frequent consultations with moulders. Not only should the pattern maker and moulder reason together, but the draughtsman should occasionally condescend to exchange opinions and compare notes with them. Such consultations cannot help but be mutually beneficial and of pecuniary advantage to the person, or persons, who foot the bills. A good workman, in constructing a pattern for frequent use, will aim to make it as strong as possible, consistent with the plans of the draughtsman, putting in plenty of fastening. No pattern maker who knows his business depends upon glue alone to hold his work together. He will give a liberal draft wherever practicable, be generous in the use of varnish, using yellow varnish (inferior workmen use black to hide imperfect workmanship). When he has secured that hard bright surface to his work, which is the delight of all true pattern makers, he must have the courage to rub down his pattern with a piece of very fine or partly worn-out sandpaper. It will then be so smooth and slippery that the moulder will probably find it necessary to have his helper sit on it, in order to keep it in the sand. I think it a good plan for the pattern maker to occasionally follow his patterns into the foundry, take a look at them in the sand, exchange a few words with the moulder in regard to parting, draw plates, etc. He may thus learn something that he did not know before. If desirous of further knowledge, let him take a peep into the machine shop, examine the casting, made from his pattern, in its position on the machine, of which it forms a part. He may then discover that he allowed too much finish on some parts, not enough on others, corners rounded where they ought to have been square, and *vice versa*. These discoveries may not be very gratifying to his vanity, but they will be useful lessons nevertheless. He will probably go back to his bench dimly conscious that the entire brains of the establishment are not necessarily concentrated in the pattern shop. If the rules of the establishment do not admit of a pattern maker spooking around during working hours, let him wait until the noon hour, then investigate on his own hook. He cannot learn too much. The more practical his knowledge the more valuable will be his services to his employer and to the trade.

SANDPAPER.

Brooklyn, E. D., N. Y.

Fig 1

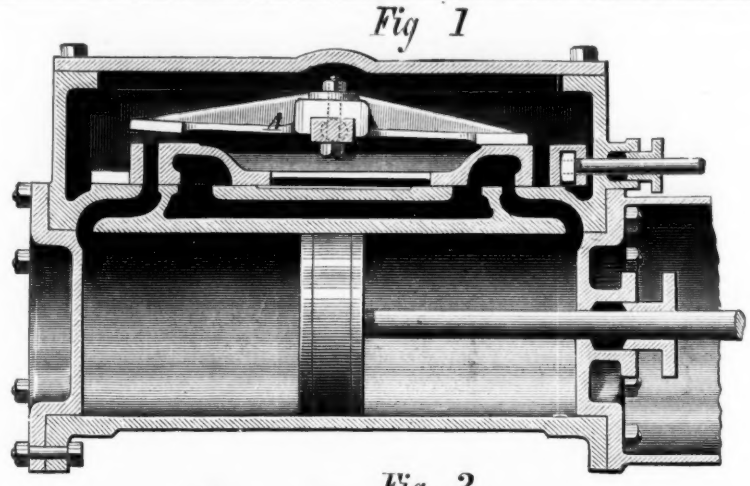
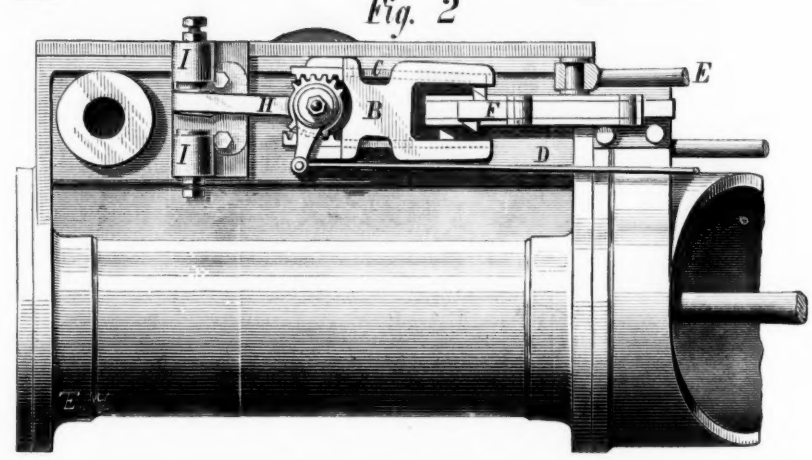
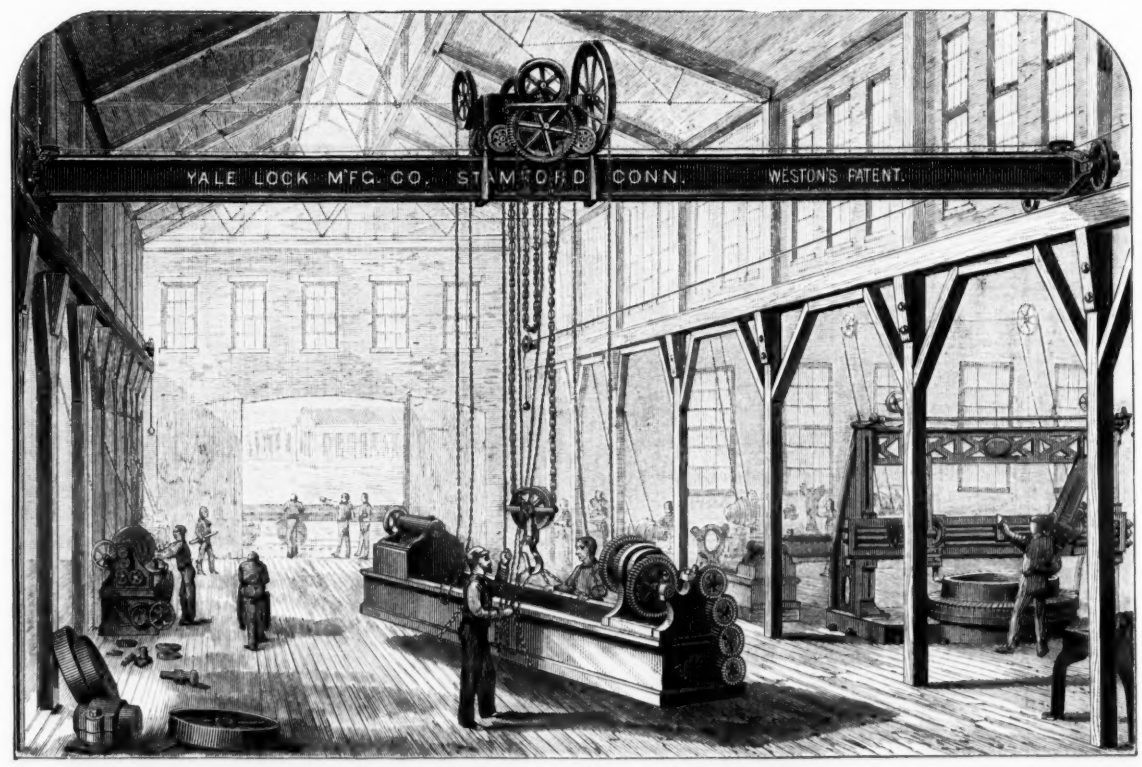


Fig. 2



FISH'S IMPROVED VARIABLE CUT-OFF VALVE.—See Page 4.



SIX TON HAND POWER TRAVELING CRANE.—See Page 4.

Information Wanted on Emery Wheels.

Editor American Machinist:

I am like many others at the present time, both pleased and surprised that so much good has been done by the "Letters from Practical Men." There appears to be no lack of practical knowledge on all subjects, when the right men can be aroused to action; and thus far these articles have proven to be of the greatest value to the craft. Let me ask the liberty of making known to the many readers of the AMERICAN MACHINIST, where there is a great need of some practical hints to the majority of machinists. That is, on the use of the emery wheel. I have visited quite a number of shops where emery wheels were used, and I am fully convinced that not more than one man in twenty has any correct knowledge of their use. If some of our brethren, who have had experience with emery wheels, will speak out for the benefit of others, they would help them greatly in the right direction. The information needed is in selecting the proper grade of wheels for the different kinds of work, and the proper speeds to run them; also, the necessary care to keep them in good working order.

W. S. HARRIS.

Croton Falls, N. Y.

Differences in Measuring the Same Length.

Editor American Machinist:

I have read in your columns, a great deal about "standard sizes" and accurate measurements, but most of the measurements discussed, were less than a foot, and occasionally as long as a meter or a yard. I wish some of the gentlemen would now tell us why no two men will measure ten or twenty feet with the same two-foot rule, and arrive at the same result, and tell us how to measure accurately distances ranging from one hundred to one thousand feet, as is frequently required to be done on large buildings. I have called on a dozen good mechanics, and requested each to make me a ten-foot pole, as accurately as possible as to length, and the subdivisions of the pole into feet, and no two were the same length, the difference between the longest and the shortest being nearly a quarter of an inch. It is not uncommon to see large buildings with one side one inch, two, or even more inches longer than the other side. If you order a fifty-ft. line of shafting in a machine shop, you are not at all certain that it will be like any fifty-feet length you are able to measure, and the next shop will measure no nearer.

What we are after now is, a correct answer to the old shop conundrum; "How long is a ten-foot pole?"

O. S.

Bennington, Vt.

Horse Power of Steam Boilers.

Editor American Machinist:

There appears to be considerable difficulty among the compilers of text books, and others, about giving a definite rule for finding the horse power of the ordinary stationary boiler.

Boiler makers have no trouble in determining the size or power of boilers, and I venture to say that what is sold for, say a 40-horse boiler, by one manufacturer, will vary very little in size from the same power of other manufacturers.

I think the following rule will give the power of horizontal, tubular boilers anywhere, and is the best rule for purposes of comparison:

Multiply the diameter of boiler by 2, and this product by the length of the boiler; also multiply circumference of tubes by their length, and add both results together. This gives the heating surface. Allow 14 square feet to the H.P. I take from the catalogue of the Squeduck Engine Co. what they call a 40-H.P. horizontal tubular boiler. It is 4 feet in diameter, 10 ft. long, and has 60 tubes 3″ in diameter. Thus, 4 ft. × 2 = 8 ft. and 10 feet length of the boiler × 8=80 the number of square feet of heating surface in heads and shell.

The diameter of a tube 3″ × 3.1416 × 120 (number of inches in length of tube) ÷ 144, (number of square inches in a square foot)= 7.854, or practically 8 square feet of heating surface in a tube 3 inches diameter and 10 feet long.

Then 480 square feet of heating surface in the 60 tubes plus 80 square feet of heating surface in shell and heads = 560 square feet of heating surface in the boiler. Taking 14 square feet of heating surface to a horse-power we have 560 ÷ 14=40 H.P. of boiler.

I think the universal custom of boiler makers is standard enough for determining size and power of boilers, and all this talk about there being no settled rule for so determining, is nonsense. This rule allows every part touched by the fire as heating surface, and does not take into account the fact that the lower portions of the tubes are not effective heating surfaces. It certainly does not require 15 square feet of effective heating surface to evaporate 30 lbs. of water per hour, as the compiler of one of these text-books seems to think; for after giving the rule to find the heating surface (⅔ circumference of all the tubes multiplied by their length), he then says, "allow 15 square feet to the H.P." He would certainly have his boilers large enough.

I cannot agree with Mr. Lyne, that cutting a hole in a boiler is a butchery. I think it is the only practical way. I have seen hundreds tapped in this way, and I have to see the first one that's been ruptured; if I should see one ruptured I would conclude that it was a butcher that cut the hole, and not a mechanic, or that the iron was not fit to go into a boiler, and should be condemned. His device is very good for tapping cast-iron, gas and water mains, and a similar one is much used for that purpose.

JOHN L. THOMAS.

Chicago, Ill.

Friction or Adhesion?

Editor American Machinist:

If the subject has not been exhausted, I would like to say a word or two about belts. I have been in the mechanical business over thirty years, and have had considerable to do with belts; and have found that the very best surface that can be produced is a pulley, covered with leather and

turned off with a point, so as to leave a soft, velvety surface. I venture to say that it is *not* friction at all that drives a belt. If there were friction, it would be from slipping; and if the belt slipped, it would not drive. I call it *adhesion*. A belt surface and pulley surface that will adhere most with the least pressure are best for all purposes. A crowning pulley is of no advantage, except to keep the belt in its place, but rather a disadvantage.

A. G. Sargent.

Chelsea, Mass.

Points in Mechanical Drawing.

Editor American Machinist:

Being a constant reader of your valuable journal, and noticing quite frequently articles on mechanical drawing, I have been tempted to write a little on the subject myself. I have not patented the application, and will give it to your readers, as I think it worthy of adoption, making allowances that we can all learn from each other. It has always been my practice, when designing a machine, to give a little thought as to how this piece or that can be constructed with the least possible expense. By referring to the drawing, it will be noticed that there is a small projection to the right of the part shown in section. It will be noticed in the plan that the projection is of cylindrical form. As this piece is to be planed and bored, it will be seen what a great help this simple addition to the pattern is to the machinist. It is to be understood that, in boring the piece, it is to rest on this point in connection with the other surfaces on the same plane, as it would be quite difficult to bore the two holes, owing to the distance being great between the centers, without the aid of this simple bearing, which I will call a spotting piece. In the lower wedge-shape drawing, it will be clearly shown what advantage these simple spotting pieces are to the workmen.

C. E. Simonds,

London St., East Boston, Mass.

Shafts and Couplings.

Editor American Machinist:

I agree with Chordal about the couplings, but I would like the bolts middling tight, with the first screw or thread turned off. Referring to pipe shafting, I worked a few years ago in a flannel mill in Worcester county, Mass., where all the shafting was tubing. The reason for the change or departure from the old rule was economy in power. The main shaft made 600 revolutions per minute, with no likelihood of heating for two reasons: first, there was always a current of cold air passing through; secondly, there was very little metal to expand (which is the main cause of shafting bearings getting cut up so unmercifully). When I find a hot bearing and oil it with heavy oil, and it fails to cool off, I make up my mind it is like three men carrying a shaft on their shoulders, with the tall man in the center carrying the heaviest load. If the hanger is of the adjustable type, drop it down at once. For counter shafts that run very fast, tubing is very desirable.

Alexander McKay,

Clyde Works, Riverpoint, R. I.

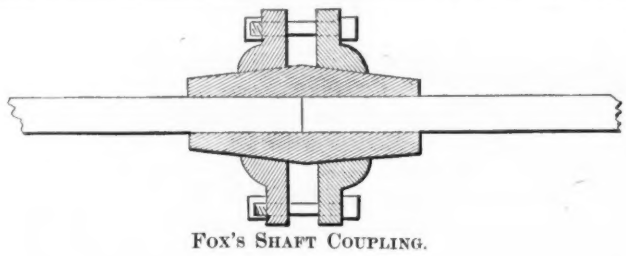
Another Style of Shaft Coupling.

Editor American Machinist:

I have been looking with great interest at the articles in the American Machinist on couplings, line shafts, pulleys, etc., and have confidently expected that out of all this discussion and criticism on old ways of doing this line of work, we should have at least some suggestions looking towards improvements which would make the troubles described by your correspondents a thing of the past. But one late writer says when he puts up a line shaft he will use plate couplings, shrink them on the shafts, and have bolts fill the holes. Sensible man! He will do his work to stay, but he must use split pulleys. The Sellers coupling was well designed—a little too much, perhaps, in being intended to fit shafts differing more in diameter than a line shaft should differ, if intended to be of the same size; and this provision, I take it, is why they are so difficult to get loose when firmly on a shaft. I know what it is to find it necessary to stop in a hurrying time and have one or two men up to the ceiling trying to get a Sellers coupling loose, while ten or a dozen more stand on the floor, offering all sorts of impracticable suggestions. I like to have the joint in a line shaft the strongest part rather than the weakest; therefore, I like a compression coupling, and I like the Sellers, except in the matter of uncertainty in the time it takes to get one loose when firmly gripping a shaft. Seven or eight years ago I thought I would try to avoid this difficulty by reversing the Sellers coupling, turning it inside out, as it were. I have made them as occasion required from that time to this, with satisfaction to myself at least, and I have heard no complaint from men using them. I give herewith a sketch which will explain itself, only saying that the sleeve or thimble next the shaft is cut open on one side. I do not offer this, thinking it settles the whole coupling question, but would like to see improvements brought out until this, as well as many other things that are made to-day, shall be so improved upon, that they will be above criticism.

A. W. Fox.

Baldwinsville, N. Y.



Fox's Shaft Coupling.

An Ingenious Counter-Boring Tool.

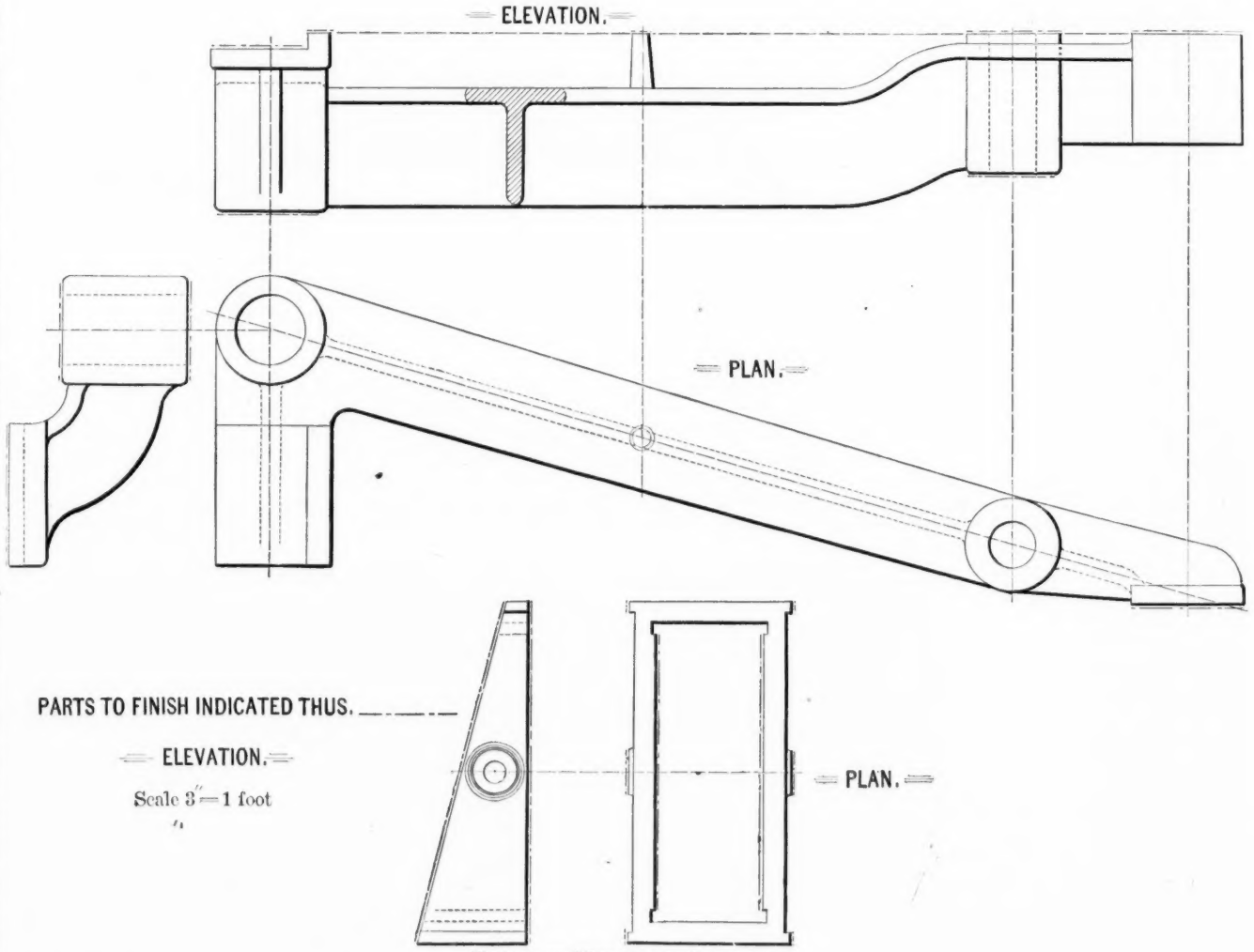
Editor American Machinist:

Noticing in your issue of Feb. 5th an article on "Tools for Locomotive Shops," it occurred to me that the tool which I herewith describe might be useful even there, though it was devised for a widely different class of work. It has always seemed to me that the common kind of counter-bores and surfacing tools were entirely behind the age, and only tolerated because it was possible to get along with them, and grub out a nondescript kind of a hole with its surface in keeping. We all know that sharp tools, as a general rule, work more easily and cut more smoothly than dull ones, and it was to avoid the difficulty of sharpening for which this was devised. It consists of a stock *A*, shown in the accompanying cut, about 10″ in length, which is properly fitted to the machine in which it is to be used. At about 1¼″ from the end of stock is formed (integral with it) a collar *D*, about ¾″ square in cross section. A mortise is central, and entirely through the collar and stock, of a size to admit the cutter *E*. Care must be taken to have it a good fit on the sides, the bottom of the mortise just coming through the face of the collar. The cutter we used was $\frac{5}{16}'' \times 1\frac{1}{8}''$, flat steel, in the cutting edge of which was a notch to embrace the guide pin of the tool. The notch in the cutter is so proportioned as to leave $\frac{1}{16}''$ of the back of the cutter projecting above the collar when the cutter is in place.

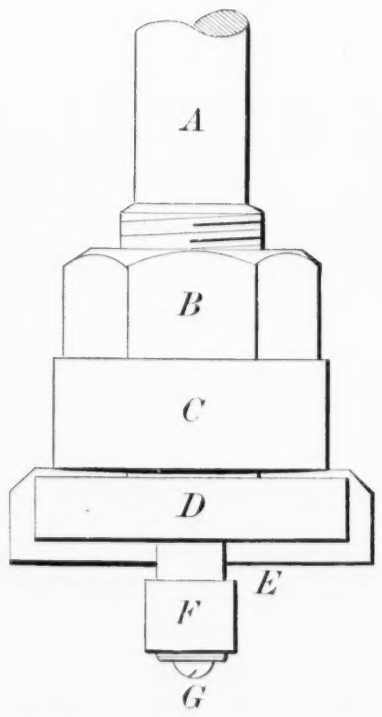
On the stock are also fitted a nut *B*, and a sliding collar *C*, which must be nicely fitted, and which serves the double purpose of a washer for the nut and of a backing for the cutter. I have found that simply the grasp of the hand was enough to secure the cutter as solid as a rock. The guide pin is fitted with the usual collars *F*, secured by the screw *G*. It will readily be seen that cutters of various lengths may be employed in the same stock, and without any danger of breaking, and when dull may be easily taken out and sharpened on a grindstone.

Chas. S. Beach.

North Bennington, Vt.



Points in Mchanical Drawing.



An Ingenious Counter-boring Tool.

Foundry Matters.

Editor American Machinist:

There have been several statements made, in communications in reply to mine, that if those straight lower core prints have troubled "Foundryman" so much, he could not have had much experience, and it might, perhaps, at this stage of the controversy, be well to state that that assertion may be true. I would ask how much experience is demanded by those who charge the writer with inexperience? That I am a novice at the foundry business, I feel convinced every time I do a job, and the next moment realize that I might have improved upon that method and will at the next opportunity.

The fact is, the *art* of moulding (it is an art) is never fully learned. The oldest and most competent moulder (*unless he is overconceited*) will freely admit that he does not, and never expects to know it all. I have been 22 years at this business, and have worked in the best shops in this country, from Maine to California. I served my apprenticeship in the largest, or one of the largest foundries in America, located in Boston, and I still assert that straight bottom core prints are the rule, and taper core

prints on the bottom of patterns are the exception (*only placed there to silence the growling of moulders*), in every locality that I have been in. I ask, as a blessing to present and future moulders, that you stop it and have one thing settled, that core prints ought to have as much taper bottom as top, be they round or square, large or small. One correspondent claims that a moulder should know which side up to mould his pattern, and then he would not get the draft wrong. That is just the point. The moulder *does* know the best way to mould it, and if he had been consulted, the draft would have been adjusted to the best method of moulding the pattern. I have stated that moulding was an art. It is all I claim for it. Good moulders, close workmen, are as rare and as difficult to find as good painters, musicians, engravers, but no more so; and the above-mentioned artists have among their number those of mediocre ability, in the same proportion as do moulders. The moulder has (as "*Old Chip*" stated in his communication) sand, iron, coal, with their innumerable variations, to contend with in every new locality; and I claim in certain localities, the water he tempers his sand with affects the production of clear sound castings. A moulder realizes all these and many more difficulties, but the person who casually enters a foundry (as do many machinist pattern makers and proprietors), does not realize it. He sees only the pattern, the flask, the aperture, which the pattern has left in the sand, and the necessarily begrimed moulder, and from the gangway forms a bigoted idea of what moulding is, and what it ought to be. In his conceit, he deems a consultation or conversation with a moulder as a waste of time, and concludes if a moulder is seen drawing a pattern with draw irons, with a thread upon them, that all patterns must have similar manner of drawing to draw them. No matter if the pattern he happened to observe weighed one-half pound, and the draw iron was $\frac{1}{4}''$, he furnishes $\frac{1}{4}''$ to draw a pattern that weighs 1,000 lbs., but does not ask the moulder, thinking the latter does not know. The above is literally true in hundreds of cases.

FOUNDRYMAN.

Toledo, Ohio.

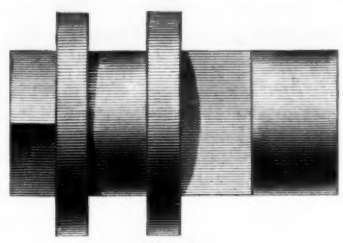


FIG. 1.

Fig. 2

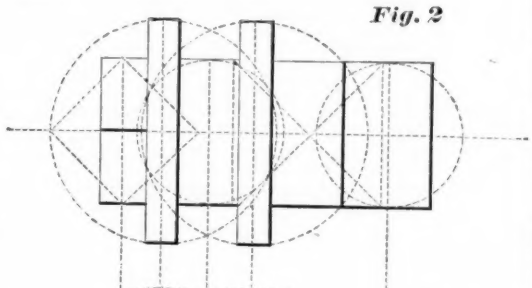
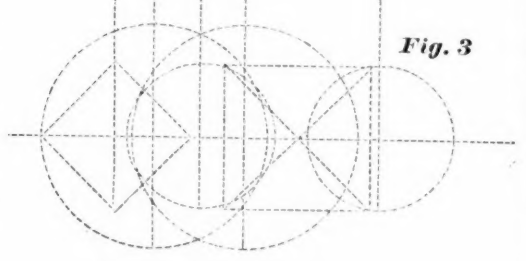


Fig. 3

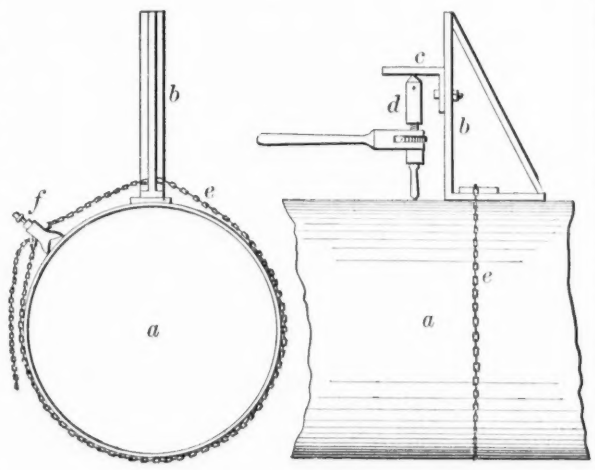


Ratchet Drilling Device.

Editor American Machinist:

I claim an improvement on Lyne's knee, illustrated and described in AMERICAN MACHINIST of Jan. 29th, which I present as a free gift to any and all my fellow workmen who have any use for it.

Referring to the illustration mentioned [which we reproduce for convenience of reference], I made one by bending two right angle pieces *b* out of $\frac{3}{4}''$ square iron. The bottom part being 12″ long, and the upright 18″ long. I made the brace out of $\frac{1}{2}''$ square iron, upset the ends, and welded in between the ends of the pieces *b*. I also welded a piece of iron about $\frac{9}{16}''$ square at the corner, thus making a slot nearly $\frac{9}{16}''$ wide, the whole length of bottom and also of the upright part. The knee *c* I fasten on with two $\frac{1}{2}''$x 2″ carriage bolts, the holes in the knee being square to fit the bolts. By this arrangement it is more easily made, and a great deal more easily adjusted, as by loosening the nuts the knee may be slid to any desired position.



LYNE'S RATCHET DRILLING DEVICE.

I had occasion to use a ratchet wrench in place of a ratchet drill, therefore I put a set screw through the arm of the knee *c* to press the drill to work.

ALBERT BAKER.

Westfield, Pa.

Different Ways of Projecting Drawings.

Editor American Machinist:

Enclosed I send you a drawing of the same figure as given in my former communication, on shaded drawings, in your issue of Dec. 4, 1880, but have shortened each section. Fig. 1 is a shaded drawing of the object, and Figs. 2 and 3 are drawn according to the recommendations of Mr. D. M. Carter, as given in your paper of Feb. 12. I quote from Mr. Carter: "To preclude all liability of a misunderstanding between draughtsman and pattern maker, or machinist, I represent by dotted lines on the center line of the drawings, or a center line thrown below a cross section of each differently-formed part, as shown in the accompanying drawings." When a simple figure makes such a confusion of dotted lines, what would a complex one look like? I should hardly have been able to cite a comparison, had I not read the excellent article of Mr. Oberlin Smith in the same issue, but he puts it into my mouth, viz.: *Harpers' Bazar* pattern sheets. Further comment is unnecessary. The illustrations fix it.

T SQUARE.

Pittsburgh, Pa., Feb. 5, 1881.

"Quirk," on Mechanical Drawings.

Editor American Machinist:

I was not a little amused to-day, on perusing your paper of the 19th inst., to find in print a conversation I had had with "Dotter" some two or three years ago, and reported by Chordal among other "Extracts" from his letters.

It seems both "Chordal" and "Dotter" took issue with me as to the duty of the draughtsman, to consider while designing, the convenience of the pattern maker and foundryman, but more particularly the latter.

My position was then, and is still, that the draughtsman should be possessed of a theoretical knowledge of moulding, and that he should exercise this in designing machinery; that when there are two or three ways of making a thing, and either of them very good, that he should choose the one that will be best to mould, and the most likely to make a good casting; that he should know the tendency of any peculiar shape to spring and avoid such, or otherwise provide for it; that he should know the ability of a core to withstand heat and to carry off vent, and proportion them accordingly.

It won't do to say that he will give to the casting the best form for the purpose, and leave the rest entirely with the mould.

Pulleys, for instance, would be much more easily turned, besides softer, and stronger, if the outer edges were beaded or had a light flange inside, and yet who would think of putting a moulder to this trouble? No, no, Chordal, you do understand moulding theoretically, and have an eye to it in the construction of your machinery.

Chattanooga, Tenn. QUIRK.

The Mining Engineers in Session.

The American Institute of Mining Engineers began its spring session at the Franklin Institute, Philadelphia, Feb. 15, according to announcement. About 150 members were present, Wm. P. Shinn presiding. The president, in his opening address, claimed that a considerable proportion of the credit of increasing the quantity, and reducing the cost of the iron and steel produced in this country, was due to the efforts of members of the Institute.

Mr. O. A. Moses, one of Thos. A. Edison's assistants at Menlo Park, read a paper descriptive of Mr. Edison's system of electric lighting, as proposed for mining purposes. Several lamps were exhibited in connection with the reading of the paper. The method suggested for lighting mines is to run wires direct from the dynamo-electric machines to the different workings, supplying light to the shaft on their way. Each lamp can be immersed in water, if desired, or may be protected from fracture by a coarse wire screen, all connections being made under water. Lamps may be put in or out of circuit without danger. The opening day's session ended with the reading of this paper.

Newly-Incorporated Companies.

NEW YORK.

Steam Gauge and Lantern Company, Rochester, N. Y.; Chas. T. Ham, F. Dewitt Clarke and others, incorporators; Capital, $250,000, in shares of $100 each. For the manufacture and sale of steam gauges, lanterns, and other illuminating apparatus. Feb. 9.

The Peerless Warp Company, New York; James E. Reynolds, Joseph Dart and others, incorporators; Capital, $2,000, in shares of $25 each. For the manufacture and sale of cotton warp, and other cotton goods. Feb. 10.

The Norton House and Ship Ventilating Company, New York; James M. Ellis, Theodore A. Neal and others, incorporators; Capital, $250,000, in shares of $50 each. For the manufacture and sale of improved apparatus for ventilating buildings, ships, vessels, etc., under patents granted to Francis L. Norton; also to license others to manufacture and sell same under said letters patent. Feb. 10.

The National Petroleum and Water Gas Company, New York; Wm. W. Gibbs, John Campbell and others, incorporators; Capital $500,000 in shares of $50 each. To manufacture and sell works and machinery of every description relating to the use of gas for heating, illuminating and other purposes. Feb. 11.

The American Gas Regulating Company, New York; Joseph B. Tiffany, W. Cayler Tiffany and others, incorporators; Capital $100,000, in shares of $100 each. For the manufacture and sale of mechanical and other appliances, for controlling and managing the consumption of gas for illuminating and heating purposes. Feb. 11.

The National Anti-Friction Car Box Company, New York; Thomas J. Creamer, D. G. Gale and others, incorporators; Capital $1,500,000, in shares of $25 each. For the manufacture and sale of anti-friction journal boxes and bearings for revolving shafts and axles. Feb. 12.

The American Pneumatic Copying Press Company, New York; Jacob S. Sammons, Sylvester P. Gilbert and others, incorporators; Capital $100,000, in shares of $100 each. For the manufacture and sale of all the pneumatic copying presses patented by Jacob S. Sammons, and all improvements thereon, and to license others to manufacture and sell the same. Feb. 12.

Johnson Manufacturing Company, New York; Edward Schell, Reuben H. Cudlipp and others, incorporators; Capital $500,000, in shares of $100 each. For the purpose of doing a general manufacturing business, but more especially to manufacture and sell Johnson's automatic grappling buckets. Feb. 12;

The Cowperthwait Company, New York; Bernard M. Cowperthwait, Montgomery B. Cowperthwait and others, incorporators; Capital $100,000, in shares of $100 each. For the manufacture, purchase, sale and letting to hire of furniture, carpets and other materials for furnishing houses, stores, offices, cars, vessels and other structures. Feb. 15.

Long Beach Marine Railway Company; E. P. Schmidt, Samuel Ward and others, incorporators; Capital $100,000, in shares of $100 each. To construct, maintain and operate a railroad, commencing at a point east of Long Beach Hotel, Long Beach, Queens County, N.Y., and running thence easterly along the beach and terminating at east end of said Long Beach. Length of road four miles. Feb. 12.

Rochester, New York and Pennsylvania Railroad Co.; Archer N. Martin, Chas. Isham, H.A.V. Post and others, incorporators; Capital $1,100,000, in shares of $100 each. Re-organization of the Rochester, Nunda and Pittsburgh Railroad Company, under a foreclosure of mortgage. Road to run from Mount Morris, Livingston County, to Ross Junction, upon the Buffalo division of the Erie Railroad. Feb. 14.

PENNSYLVANIA.

Pittsburgh Steam-Heating Company, Pittsburgh; George B. Mitchell, J. C. Eichbaum and others, incorporators; Capital stock, $20,000, in shares of $100 each. For manufacturing steam-heating apparatus and supplying heat to the public by means of steam. Feb. 11.

The Wheatland Bessemer Steel Company, Wheatland, Mercer County; James W. Friend, W. P. Longbry and others, incorporators; Capital stock, $25,000, in shares of $100 each. For the manufacture of iron and steel, or both, or of any other metal, or of any article of commerce from metal or wood, or both. Feb. 11.

Altoona Heat Company, Altoona; John P. Levan, Wm. Murray and others, incorporators; Capital stock, $5,000, in shares of $20 each. For the manufacture, distribution and supply of heat to the public. Feb. 14.

MASSACHUSETTS.

Phœnix Machine Company, Tewksbury; Wm. E. Whitehead, President, Abel T. Atherton, Treasurer; Capital $24,000 in shares of $100 each. For manufacturing machinery and working fibrous materials. Feb. 14.

CONNECTICUT.

Underwood Manufacturing Company, Tolland; Frank N. Underwood, Frank O. Underwood and others, incorporators; Capital $3,500, shares $25 each. Manufacture of belting and other leather goods. Feb. 14.

The Castle Peak Mining and Smelting Company, New Haven; Capital $100,000, in shares of $100 each. For mining, milling and smelting ores in Colorado. Geo. A. Butler, Henry C. Shelton, E. Henry Barnes, *et al*, incorporators. Feb. 14.

The Case School of Applied Sciences, at Cleveland, O., will be opened to the public on April 6, for a special or preparatory term of twelve weeks. The regular course will begin in September. The trustees intend to experiment upon the best method of conducting the school before committing themselves to any particular one. They propose during the first year of the school to give special prominence to those branches of science immediately connected with the development of the natural resources of the country. The fee for the preliminary course will be $20; for the full course it is thought $100 will be asked. French and German, astronomy, drawing and mathematics, will be taught during the spring term.—*New York Tribune.*

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☞ *We invite correspondence from practical machinists, engineers inventors, draughtsmen, and all those specially interested in the occupations we represent, on subjects pertaining to machinery.*

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NEW YORK, MARCH 5, 1881.

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The printed date on each wrapper shows the time to which the subscription is paid. We discontinue the paper in all cases when the time paid for has expired, unless renewed.

Government Subsidies to Corporations.

One of the most promising signs of the action of healthy influences in our national body politic is the decided rebuff received by the applicants for government subsidies at Washington. Recent events have shown that, while Congressional committees may be moved to favorably report schemes for opening the public treasury to make handsome presents to a combination of wealthy men, under the pretence of receiving a public benefit through the carrying out of some private business arrangement, the collective indorsement of the people's representatives is a harder thing to obtain than it was a few years ago. This means that public sentiment is strongly opposed to making such a flagrantly unjust use of the people's money and is ready to assert itself, if disregarded, in a way not to be mistaken. When presents of public money or public lands are given to corporations, a plea is always set up that, by carrying out some railroad or steamship project, labor will be given employment and general business increased. No subsidy has ever been legislated into the hands of a corporation in this country with any provision as to the amount that should be paid out for labor, or the rate of wages that should be paid. The result has been that mechanics and laborers have received but a very small proportion of any government subsidy, while the original recipients of the bounty have never failed to reap a lucrative profit.

If the government is to pay for the employment of labor, let it be upon public works of some kind, and let the benefit accrue to the whole people, rather than to a few wealthy individuals.

The Ninetieth Birthday of Peter Cooper.

On the 12th of February Peter Cooper celebrated his ninetieth birthday at his residence in this city. He signalized the occasion by a donation of $30,000 to Cooper Institute, in addition to the $70,000 he has expended for improving and enlarging it during the past year, also $10,000 to a fund far aiding poor children.

Mr. Cooper's life has been one of the highest usefulness and honor. Having accumulated great wealth solely by his own industry, perseverance and ability, he chose to devote, during his lifetime, a large portion of it to the education of youth, in such practical knowledge as will enable them to earn an honest and comfortable livelihood, also in many other benefactions for the good of his fellow men.

The name of Peter Cooper will be held in grateful remembrance by all his countrymen when, in spite of grand chiseled monuments, the names and memories of those men of immense wealth who use their powers to squeeze down the dependent classes to a poorer condition, are recalled only for execration.

Upon the evening of Peter Cooper's birthday, an address was delivered in Cooper Institute, by Rev. H. L. Singleton, from which we make the following extract, setting forth, as it does, a bright example for young and penniless mechanics:

Peter Cooper started in business very early, and in hard manual labor. He remained with his father until he was seventeen years of age, when he was apprenticed to a coachmaker, and his evenings were spent in an upper room of his grandmother's house, on lower Broadway, in reading and experimenting. Ah, he made use of his evenings—those times of the day which decide the fate of so many workingmen. The result of his evening experiments was a machine for mortising hubs, the first of its kind in this country, and his master offered to set him up in business, but Mr. Cooper, with a horror of debt, refused to accept the offer, preferring to work his way up. After this refusal he went to Hempstead, L. I., where he worked for a maker of shearing cloth machines at $1.50 a day, and in three years he had saved enough to buy the right for the State of New York, and set himself up as a manufacturer. The first machine made by him was sold by him to Matthew Vassar. In 1828 he went to Baltimore, set the Canton Iron Works on foot, and made the first successful locomotive on the Baltimore and Ohio Railroad.

In 1826 George Brown, the founder of the present house of Brown Bros., then in Baltimore, called a meeting to do something to save the trade of Baltimore, then being diverted to New York by the opening of the Erie Canal, and on Feb. 28, 1827, the first railroad company in the United States was organized. Horse cars were first proposed, and then a car to be driven by wind sails, and at the critical hour, when everything else had failed, Mr. Cooper promised to build a locomotive that would run on the road, and produced the "Tom Thumb," with a boiler half as big as that of a kitchen range, and other parts in proportion. On the day of trial, Mr. Cooper, acting as his own engineer, opened the throttle-valve, and the engine drew the car with twenty-six directors, to Ellicott City, thirteen miles, in fifty-seven minutes. On the return trip, however, a steam-cock blew off, and the engine was beaten by a horse car on the adjoining track. But the victory was with Mr. Cooper. An inventor himself, he has been the friend of inventors all his life. He was the President of the North American Telegraph Company twenty-six years ago, and it is due to his enterprise that we have to-day the railroad and the telegraph. He took up the invention of Morse, and carried the wires from city to city and under the waters of the ocean. His works at Canton, opposite Baltimore, support a population of 100,000 souls. The success of the Baltimore and Ohio road was the salvation of the city of Baltimore, and that is due to Mr. Cooper. Mr. Cooper's philanthrophy is not second-handed, nor single-handed, but double-handed. To give is his luxury, and he has not wasted the aroma of his gifts by having them pass through other hands. He has not made paupers either by helping those who are too idle to help themselves. Nor has he waited until death has come before he gave his fellow-men the benefits of his gifts. He has shown rare discrimination in this institution in solving the problem of the age—the relations of labor and capital. It would be a miracle to find one educated man here arrayed on the side of those who would bring on a conflict between labor and capital. Mr. Cooper is the best example I know of true manhood arriving at the highest success. His inventive success is too broad for us to go into in detail, but not least among his inventions was a self-acting musical cradle. This recalls the fact that George Stephenson, the English inventor, invented just such another contrivance. Naturally an observer and an expert workman, to meet a want was with Mr. Cooper to construct a device to meet it. The full story of his life centuries will not tell, for the outcome and the full results of his life it will take that time to see fully developed.

Reducing Cost and Improving Quality.

Four months ago a thorough and experienced mechanical engineer of our acquaintance took charge as superintendent of a manufactory of electrical apparatus, employing over a hundred men. He had no scientific knowledge of electricity, but, after reorganizing the mechanical part, went to work with a determination to master its principles as applied to the business in hand. Said he, "I never studied so hard at school as I have for the last three months." The result is, that the leading article made by the establishment, which, up to the time of his taking charge of the work, cost $65 each, is now turned out, of better quality, at $8 each, and he expects to *reduce the cost to* $6 *each!* This we mention as an example of what might be done in hundreds of other manufacturing establishments in this country.

Starting Ship Canals.

While the projectors of the Nicaragua Ship Canal and the Tehuantepec Inter-Oceanic Railway are industriously engineering in the legislative halls at Washington for a present of the people's money or credit, the work of excavating the Panama Ship Canal has commenced and is to be carried on by the company until it is completed. No government aid is solicited. One of the great achievements of its projector, M. De Lesseps, is the cutting of the Suez Canal, the total traffic of which, during 1880, amounted to 2,026 ships of 4,349,548 tons, producing a revenue of 39,750,000f., thus enormously surpassing the traffic of any year since the opening of the canal ten years ago.

An Iowa machinery firm announces as a feature of their manufacture, "Nigger Engines for Raft Boats," regardless of the fact that the fourteenth amendment expressly precludes invidious reference to race, sex, or previous condition of servitude. This is wholly wrong; even raft-boat engines should not be called names in this reckless fashion.

Foreign Industrial Exhibitions.

The Melbourne (Australia) Exhibition will not close until April 30, the date having been extended from March 31. The newspapers of the United States and England have so far given this Exhibition little notice in their columns. The Exhibition appears to be well attended by visitors.

A Commission has been appointed to organize an Industrial Exhibition at Madrid, Spain, to be opened in September, 1882; while Guatemala, the largest and most enterprising of the Central American States, also intends holding an Industrial Exhibition in 1882. Verily, these are the days of Exhibitions!

The Mechanical Engineers' Organization.

One year ago to-day (February 16th), the preliminary meeting for the purpose of organizing the American Society of Mechanical Engineers was held in the office of the AMERICAN MACHINIST; those present responding to the call of Prof. John E. Sweet, with a view to national organization. Thirty engineers took part in this meeting, the day's session terminating with the appointment of committees, and authorizing the chairman (Mr. A. L. Holley) to call another meeting to complete a permanent organization. With the proceedings of the meeting for final organization, April 7, 1880, the issuing of the first catalogue of the society, and the proceedings of the first annual meeting, held at the Union League Theatre, New York, November 4 and 5, 1880, most readers of the AMERICAN MACHINIST are familiar, as we have published every paper read before the society, entire, with the engravings, except two of which we gave a synopsis. The new catalogue of the society just issued is similar in appearance and arrangement to the first, except that it contains the full list of committees and officers appointed, together with a list of the new members, associates and juniors, elected at the annual meeting.

The new catalogue bears date January, 1881, and comprises a total membership of 219, divided as follows: Honorary Member, 1; Life Members, 2; Members, 187; Associates, 17; Juniors, 12. The only name on the death roll is that of the presiding officer at the meeting for final organization, Henry R. Worthington. The society's official report of proceedings at the annual meeting has not yet appeared. We trust this report will appear soon, together with announcements of time and place for holding the Spring meeting, so that none of the admirable impetus with which the society started may be lost. Neither of the older engineering societies in this country had a membership so large or so influential at a like early stage in their history. The new catalogue may be obtained of the secretary, Thos. W. Rae, 239 Broadway, New York.

Transit Nuisances of Two Cities.

In Philadelphia, certain horse-car lines seem to cater more to freight than passenger traffic, nearly every car having more space devoted to luggage than to passengers, bulky market and clothes baskets largely predominating. The splendid facilities thus afforded for the spread of infectious diseases would seem to be beyond question.

In New York the elevated railroads, by refusing to adopt a system of automatic signals, endanger the lives of their passengers every time icy weather impedes the

tracks, or fog obscures the view of the engineer.

Also, the ferry boats plying in the rivers and harbor of New York, apparently intend one of the two cabins on each boat for ladies and gentlemen, and the other for some particularly filthy kind of animals, if one may judge from the condition of the two cabins without reference to the inscriptions on the doors. The idea of keeping both cabins fit for occupancy by either ladies or gentlemen, and requiring the smokers and spitters to ply their pastimes in the open air outside, seems never to have dawned upon the ferry officials.

Suggestions for Improvements.

Among the readers of the AMERICAN MACHINIST there are many who write us occasional letters suggesting the introduction of new features in the paper, or the advocacy of some particular plan relating to engineering. Whether we act upon these suggestions or not, they are none the less welcomed to consideration. Often, when we do not carry out the things proposed, the ideas advanced in these letters prove of value to us in meeting the desires of a large portion of our readers.

Several have written us to agitate the subject of National laws for steam-boiler inspection, also State and National laws for the inspection and licensing of engineers. The objects to be accomplished by such enactments are excellent, but as they have in almost every instance, as far as stationary boilers were concerned, proved a failure, we should like to see the business undertaken in a way open to fewer objections than any legislative steam boiler enactments heretofore tried. A few weeks ago we referred to a system giving superior results in England, which is worthy of adoption in this country.

Another writer suggests that we publish something on repairing boilers. We should be glad to hear from some of our correspondents who have developed any valuable kinks in that department.

Another suggests that he has often thought that "it would be a good idea should you publish one column devoted wholly to engineers," and proceeds to explain the difficulties engineers encounter in understanding highly scientific papers. There are quite a large number of engineers in different parts of the country who find rather more than a column a week in the AMERICAN MACHINIST devoted to their interests, and who frequently send us letters commending, in the most glowing terms, the plain practical way of putting things as found in our columns.

Another suggests that we have a column or department exclusively for apprentices. While we are always ready to aid apprentices, we are of the opinion that such a department, if contributed to wholly by apprentices, would be of less value to them, as a class, than the same space devoted to contributions from experienced mechanics.

Another writes to suggest that we invite engineers who have charge of stationary engines and who use the indicator, to communicate to our columns the condition of their engines and the length of time they have been running, mentioning, of course, the kind of engine in every case. The only objection we have to this plan, which, certainly, is indicative of enterprise on the part of its proposer, is that if strictly carried out, we should have no room for anything else in the paper.

Another suggests that we "write up" the manufactories of each of the large cities of the United States *seriatim*. Our objection to this proposition is similar to that just mentioned, besides which we do not wish to run opposition to the United States census.

Two or three mechanical engineers have suggested that we introduce a department for millwrights. A few weeks ago we considered that matter on this page, with reference to a letter from one of our correspondents.

We shall, as heretofore, be obliged to our readers for any useful suggestions they may see fit to communicate.

It is now thought that the proposed North Shore, Long Island, N. Y., Railroad, from Astoria to Northport, thirty-seven miles, can be built for $450,000, provided $150,000 be subscribed and $300,000 of stock taken.

QUESTIONS & ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly and according to common sense methods.

NOTE.—Those who desire answers to questions must give their names and addresses or no notice will be taken of their communications. A great many anonymous letters are carefully deposited in the waste paper basket every day.

(1) G. E. E, London, Ont., asks: 1. Why is it that the piston of a steam engine advances faster at one end of the cylinder than it does at the other? *A.*—The difference in the velocity of piston is caused by the relative proportion of the length of the connecting rod to the length of the crank, and becomes less as the length of the connecting rod is lengthened. 2. What is meant by balancing a cylinder? *A.*—You do not state whether it is a steam engine cylinder or a revolving cylinder, and we cannot answer until we know which you mean.

(2) J. J. D., New York City, asks: 1. Please inform me if a cut-off, sliding on the back of main valve, can cut off steam before and after ½ stroke, say from ¼ to ¾ with eccentric fixed at one point? *A.*—Yes, you can cut-off from ¼ to ¾ of the stroke with a fixed eccentric, by having a right and left hand screw or cut-off valve adjusted by a hand wheel from the outside. 2. Is the cut-off eccentric set before or after the main valve? *A.*—The eccentric when direct acting is generally set before the main slide eccentric. 3. Is steam taken from cut-off past the front or back edge of valve? *A.*—This depends upon the pattern of valve adopted, as some take steam from the outside edge and some the inside while others take steam through the valve.

(3) J. G., Rosedale, Kan., asks: Will you kindly inform me how to find the dimensions of a steam cylinder for a number of Horse Power, the average steam pressure being sixty pounds? *A.*—Multiply the number of Horse Power by 33,000 and divide the result by the piston speed in feet intended to run, multiplied by the steam pressure; the result is the area of cylinder in inches, the stroke you can determine for yourself. Thus 50 H.P. with 60 pounds pressure at 300 ft. per min. is

$$\frac{50 \times 33{,}000}{300 \times 60} = 91.1 \text{ square in.} =$$

10.75″ diameter.

(4) H. E K., Toronto, asks: What is the proper angle for a friction clutch. *A.*—About 55 degrees.

(5) G. W. F., Boston, Mass., writes: 1. Will you give me some information on the proper way to put a beam engine into a side-wheel boat so as to have it in proper line; in other words, how to line it up as it should be? *A.*—To answer this question in detail would require an article, but we will give some of the most important points to be observed, from which an engineer, understanding the first principles of mechanical construction, aided by good common sense, can work out the rest for himself. In the first place a center line should be drawn by a cord longitudinally from stem to stern above the main keelson, then another line should be drawn "athwartships" at right angles to the first line, and about the position determined for the main shaft, being placed parallel vertically with the deck beams, where they connect with the frames of the hull. Two straight edges should be secured to the keelson—one forward and the other aft of the engine, with one of their edges in contact with the fore and aft line, the same edges being set vertically square with the line "athwartships." The bed plate, cylinder, slides, main and walking beam pillow blocks, are all set by these straight edges, bearing in mind that on a vessel everything about the engine is set in position from a stretched line and square. 2. Can you give me the power of a condensing beam engine, 34″ diam. of cylinder, 8 ft. stroke, 30 revolutions per minute, steam pressure 40 pounds, cutting off at ½ stroke? *A.*—The mean pressure of steam at 40 pounds is 33.8 to which add say 13 pounds for vacuum=47 pounds area of piston, 907.9 square inches, piston speed 480 ft. per minute.

$$\frac{907.9 \times 47 \times 480}{33{,}000} = 620 \text{ H. P.}$$

(6) H. P. Marlboro, Mass., asks: Will you please give me a decision on the outside diameter of a worm gear, diameter having 54 teeth, to fit a worm of five inches diameter, and a pitch of 1⅛″? Your verdict will settle a slight discussion which has arisen between my superintendent and myself. *A.*—The gear should be 25.8″ at the pitch line. The outside diameter can only be given when the depth of the tooth is known. If the gear is grooved concave the pitch line is generally located half way between the extreme top and bottom of tooth.

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J. C. Hoadley, Engineer and Expert, formerly of Lawrence, Mass., has opened an office at 29 High St., cor. Federal, Boston, Mass., where he will be pleased to receive old and new friends.

Steam Engines Indicated and Examined. Power Measured. W. H. Odell, P. O. Box 274, Yonkers, N.Y.

Bound volumes for 1880 of the AMERICAN MACHINIST, containing the full 52 issues of 1880, neatly bound in cloth, ready to ship by express, for four dollars. AMERICAN MACHINIST PUBLISHING CO. 96 Fulton Street, New York.

MANUFACTURES.

A new theory of the conversion of bar iron into steel by the cementation process has been advanced by Mr. R. S. Marsden. He attributes the result to the diffusion of the carbon in the condition of an impalpable powder into the heated iron, and he believes that silicon can diffuse itself in a similar way through iron. This action of the carbon in iron is analogous to the penetration of a red hot porcelain crucible by carbon, a phenomenon which was observed and commented upon by the author some time ago.

The Union Manufacturing Company, New Britain, Conn. (Warehouse, 96 Chambers Street, New York), write us:

The demand for Skinner's patent combination chuck is such that we are far behind our orders, and are about to increase our facilities quite largely that we may fill orders promptly. Every one who has tried these chucks pronounces them perfect. The fact that all parts are made interchangeable is greatly appreciated, and the ease and quickness with which the chuck can be changed from universal to independent and *vice versa* is making them very popular.

We have just learned that the Duplex Safety Boiler Company are putting in two of their improved boilers, each of 100 horse power, at the Ansonia clock factory, in Brooklyn, N. Y.

The Springfield Foundry Co. (Edward W. Seeger, Treasurer), Springfield, Mass., have begun the manufacture of fine gray iron castings, soft and easily bored. They are equipped so as to promptly fill orders received by mail from any accessible locality.

The city of Indianapolis has refused, by a large majority, to appropriate $100,000 for the proposed Indianapolis Southern Coal Railroad, on condition of locating shops at that point.

Upwards of 150 men are now employed at the Quebec, Montreal, Ottawa & Occidental Railway workshops, foot of Crown Street, Quebec, putting in and fitting the necessary machinery. The foreman complains of the difficulty of obtaining good machinists and iron-workers used to locomotive repairing. Several are now required at the shops.

The Standard Manufacturing Company, of Chicago, employing fifty hands in the manufacture of machine screws, have purchased the ground at the corner of Erie and Kingsbury Streets, and are building a substantial brick structure for their business, the main building being 140 by 40 feet, three stories and basement, and the foundry 140x60 feet. Their new quarters will be fitted up with machinery of the latest improved designs, increasing the operations of the works to three times their present capacity.

The Straight Line Engine Co. Syracuse, N. Y., have all they can do, and with others have an order for a 20 horse power engine from Germany.

The Yale Lock Company, Stamford, Conn., have lately furnished three of their traveling cranes, of six tons capacity each, to the government for use at Washington, in handling stone for the Washington monument; also, one of 2½ tons capacity, for the United States Navy Yard at Norfolk, Va. Many others are in use in private hands.

It is equally adapted to handling loads of all kinds, and to use in machine or boiler shops, stone yards, freight houses, and, indeed, in any place where heavy loads require to be handled.

The Central City Knife Works has been removed from Syracuse to Phœnix, N. Y., where they are furnished with water power at a nominal rate, and where they are now running with a full complement of men.

The Sweets Manufacturing Company, Syracuse, N. Y., are putting in the Brush electric light, with a view of running a double set of men.

The Stow Flexible Shaft Co., Philadelphia, write us:

Our sales for 1880 were much larger than ever before, being an increase of 25 per cent. over those of 1879. The character of the sales, too, is very encouraging, our goods going among many of the best railroad and machine shops of the country, and meeting with almost universal satisfaction. We have taken into our own shop the manufacture of some articles we had previously had made outside, thus giving employment to a few more men; and we contemplate this year making everything ourselves. This will necessitate the purchase of some new machinery, for which we are now on the lookout. We have moved during the year into our present larger and more commodious quarters, and wish already that our shop were as large again. We find it hard work to keep sufficient stock ahead to meet our orders, and are running to the limit of our present capacity. The new year has opened very promisingly, and we look for a large increase in sales over those of 1880.

The building of the Nashua, (N. H.) Co-Operative Foundry is to be 140 by 40 feet.

J. F. Hess & Bro. have leased the Excelsior Works in Massillon, O., and intend to engage largely in the manufacture of air and force pumps.

The Huntington (W. Va.) car works have commenced operations. John Kelly is boss of the works.

Pennock Bros., Minerva, Ohio, will in the early spring put up a first-class car shop 60x100 feet, and increase their capacity very largely.

Wetherill & Bro., Chester, Pa., intend making extensive improvements and enlargements in their office, boiler, and machine shops.

The Connecticut Legislature has been asked to grant permission to the Seth Thomas Clock Company of Thomaston, the right to increase their capital to a sum not exceeding a million dollars. The present capital of the concern is $500,000.

A new large blast furnace is to be erected at Hanging Rock, Ohio.

Blackville, S. C., has a foundry and machine shop in prospect.

The Chinese government has at last resolved to allow railroads to be built through the Empire.

A movement is on foot to start a cotton factory at Hodges, in Abbeville County, S. C. Fifteen or twenty thousand dollars have been subscribed by persons living in Hodges, and the projectors of the movement expect to secure $60,000 to $80,000 in subscriptions, and have the factory in operation by the first of next October.

A. G. Pettibone, late president of the Citizens' National bank of Indianapolis, and A. H. Mulliken, for the last twelve years connected with the house of Crerar, Adams & Co., have formed a partnership under the firm name of Pettibone & Mulliken, for the purpose of manufacturing and dealing in railway equipment and supplies, in Chicago.

A new electric light company was organized in Detroit, Mich., February 14, with a capital of $500,000, for the purpose of manufacturing electricity for lighting, heating and driving machinery. The new company is called the Edison Electric Light Company of Detroit.

The Washburn & Moen Manufacturing Company, Worcester, Mass., are to have a large extension to their works. A one-story wooden building 350 by 60 feet, is to be put up to accommodate 50 barb-fence machines, which will add 20 to those now in use. An engine room, 40 by 45 feet, will also be built.

The Freeman Manufacturing Company of North Adams, Mass., will at once enlarge their print works, and will it is said, build two or three new cotton mills.

Machinists' and Engineers' Supplies.

NEW YORK, Feb. 17, 1881.

Trade remains much the same, no changes in price of any importance being noted.

H. B. Smith Machine Co., 925 Market St., have taken the Philadelphia agency for the Tanite Company's Emery Wheels and Grinding Machinery.

The Hartford Engineering Co., Hartford, Conn., have begun the manufacture of the Medart Wrought-iron rim Pulley, which possesses some especially valuable features that will be noticed hereafter.

A new kind of shafting, drawn out like wire through a die and afterwards smoothed or polished in a lathe, is now being introduced. Further particulars to appear in a later issue.

Iron and Metal Review.

NEW YORK, February 17, 1881.

Pig and Bar Iron are unchanged in price. Steel rails are a little higher in price. Boiler plates weak at—Tank, 3c.; Refined, 3¼c.; Shell, 3¾c.; Flange, 4¾c.; Fire Box, 5½c.; Boiler Tubes 40 per cent. off.

LUCIUS HART & CO., 8 & 10 Burling Slip, New York, furnish us the following to-day:

Metal market quiet. Pig Tin in London, £90 10s; Singapore, $28; Spot Market we quote nominally, Banca Tin, 25c.; Malacca and Straits, 20½c.; Australian, and Billiton, 20¼c.; "Lamb & Flag," 20¼ to 20½c.; Bar Tin, 22c.; Antimony, 14½c. to 15½c.; Spelter, 5¼c., Western; 8c. to 8¼c. for "Bertha," pure; Solder No. 1, 11½c.; "Half and Half," 13½c.; Bismuth, $2.50.

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Wanted.—Situation by a mechanical engineer and draughtsman, 14 years experience. Good on special tools and machinery "for light work" in all branches. Address, Box "2," AMERICAN MACHINIST, 96 Fulton Street, New York.

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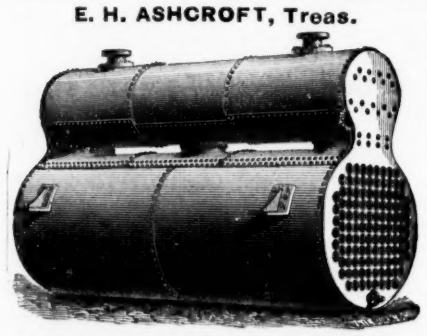

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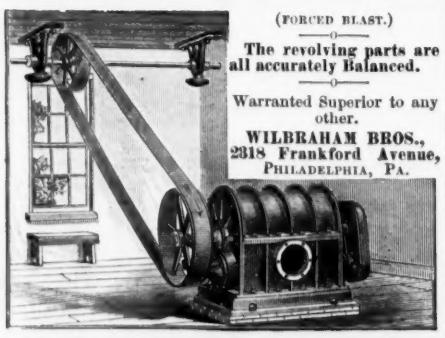

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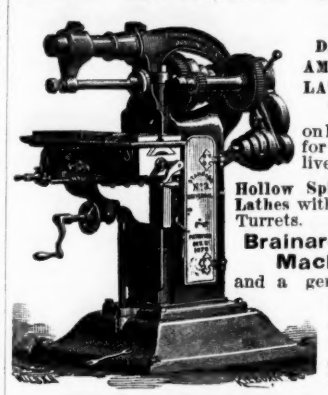

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Messrs. KEARNEY & FOOT, Elizabethport, N. J., July 9th, 1877.

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Messrs. KEARNEY & FOOT, Elizabethport, N. J., May 3rd, 1877.

Gentlemen:—We have been using your Files, both new and re-cut, for several years, and take pleasure in saying that we have found them a very superior article.

HANS REISE, Contractor, with The Singer M'f'g Co.

We print on card board 10 x 12 in. "Instructions on the use of Files," which are intended for shop use. These instructions with our "Illustrated Catalogue of Files" we mail on receipt of 27 cents postage. To customers we mail a complete set free of charge. **KEARNEY & FOOT.**

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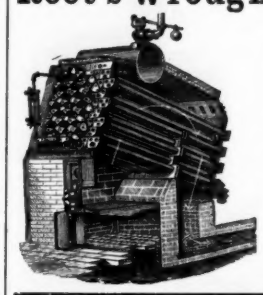

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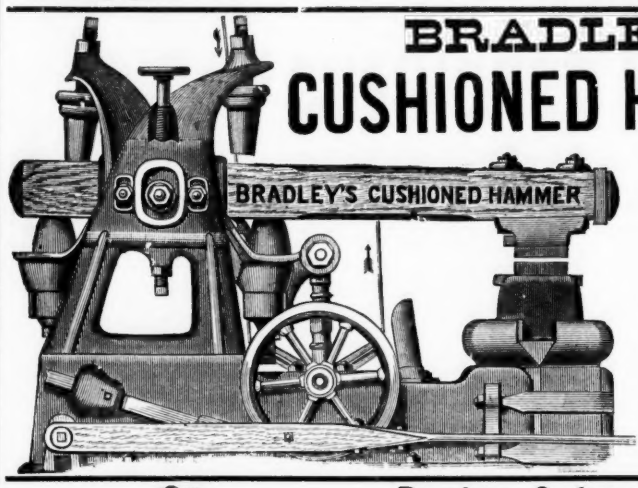

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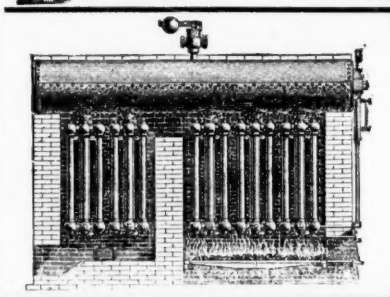

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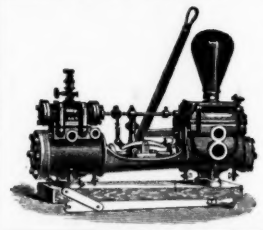

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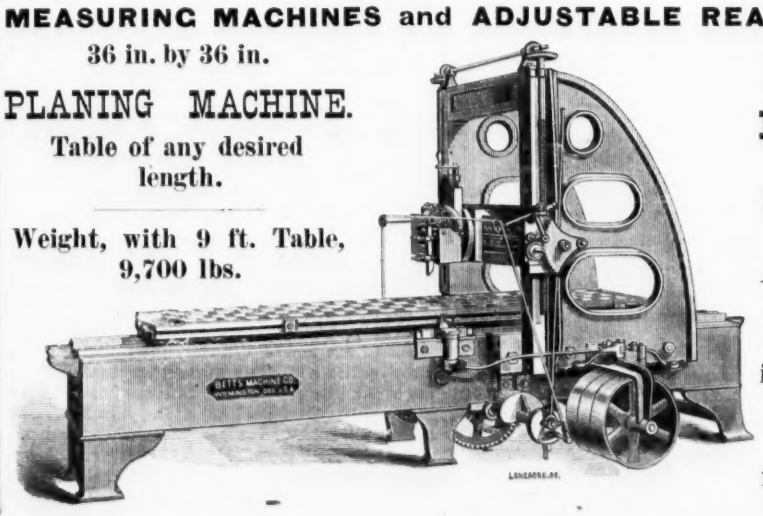

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